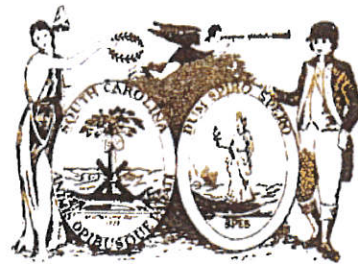


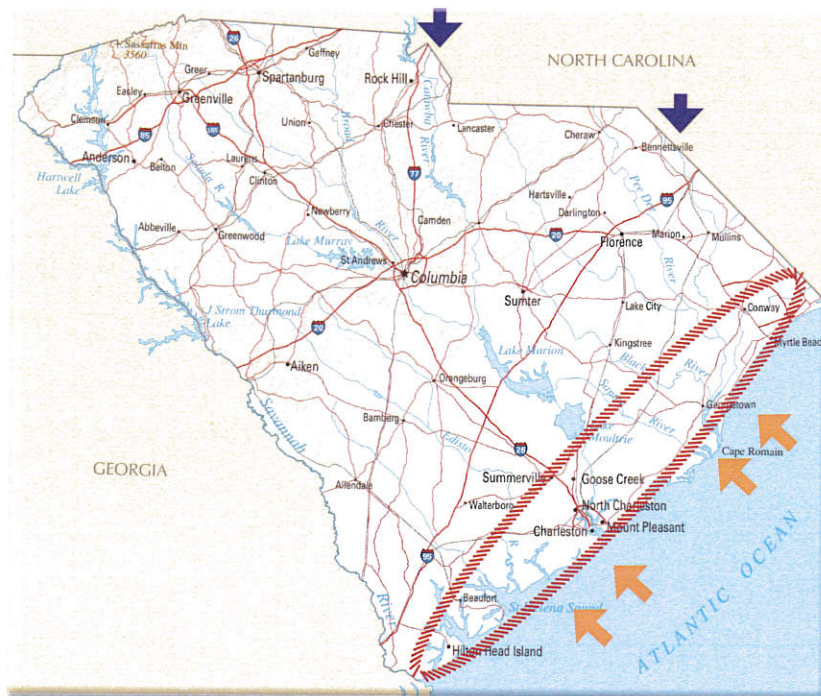
State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

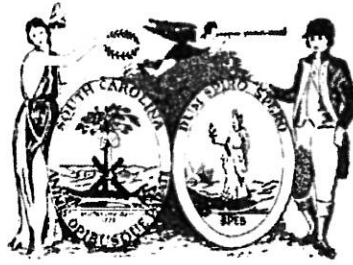


TASK FORCES

- | | |
|-------------------------------------|---------------------------------------|
| Smart River & Dam Security | Artificial Reef Systems |
| Federal Funding | Grid Security |
| Stakeholder Engagement | Living Shoreline |
| National Security | Economic Development |
| Infrastructure & Shoreline Armoring | Landscape Beautification & Protection |

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

ORGANIZATIONAL MEETING
THURSDAY, DECEMBER 20, 2018
10:30 AM – 11:30 AM
BROWN BUILDING, SOUTH CAROLINA STATE HOUSE GROUNDS
COLUMBIA SOUTH CAROLINA

AGENDA

- OPENING REMARKS – GOVERNOR HENRY D. MCMASTER
- OVERVIEW OF FLOODWATER COMMISSION – THOMAS S. MULLIKIN
- REVIEW OF TASK FORCES AND INTRODUCTION OF CO-CHAIRMEN
- 2019 TIMELINE
- CLOSING REMARKS / PRESS AVAILABILITY

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

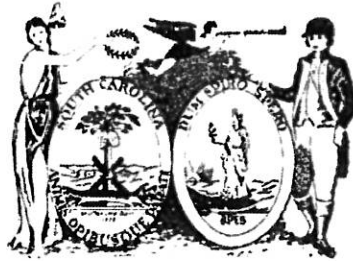
FULL COMMISSION 2019 QUARTERLY MEETING SCHEDULE

1 st Quarter Meeting – CTL/Founders Hall	Friday, February 8 th
2 nd Quarter – Paris Mountain SP	Saturday, June 15 th
3 rd Quarter – Cheraw SP	Saturday, August 31 st
4 th Quarter – Greenwood SP	Friday, November 8 th

MEETING TIMES
10:30 AM – 12:30 PM

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

CO-CHAIRMEN ARTIFICIAL REEF SYSTEMS TASK FORCE

ALVIN A. TAYLOR

Director, South Carolina Department of Natural Resources

Alvin A. Taylor is Director of the South Carolina Department of Natural Resources (SCDNR). He serves as the chief administrator for natural resources in the State and is responsible for management and supervision of the agency's five line divisions: Office of Support Services; Land, Water & Conservation; Law Enforcement; Marine Resources; and Wildlife & Freshwater Fisheries, with a staff of over 900 people in numerous locations across South Carolina. Alvin graduated from Clemson University in 1976 with a BS in Zoology. He completed training at the U.S. Coast Guard Law Enforcement Training Center in Yorktown, Virginia, in 1976, and graduated from the S.C. Criminal Justice Academy in 1977. He began his career with the agency in 1977 and progressed through the ranks serving as an officer, private first class, sergeant, lieutenant, captain, major, and colonel, the agency's law-enforcement chief. He is a certified SCUBA diver and for several years supervised the DNR Aquatic Investigations and Recovery Unit dive team. He is an active member of the National Association of State Boating Law Administrators (NASBLA), serving as its president in 2003, and he is the State Boating Law Administrator for South Carolina. On December 8, 2011, the seven-member SCDNR Board named him Acting Director of the agency, and on March 17, 2012, he became the agency's permanent Director.

Among his many honors and awards, Alvin has received the 2013 Strom Thurmond Award for Excellence in Law Enforcement, Governor Carroll A. Campbell, Jr., Leadership Award in 2005, Meritorious Public Service Commendation from the Department of Homeland Security in 2004, Patriotic Employer Award from the National Committee for Employer Support of the National Guard and Reserve in 2003, the DNR Meritorious Service Award in 1997, the Bonner Award, the NASBLA Award from the National Association of State Boating Law Administrators, the SC Association of Conservation Districts President's Award in 2014, the National Wild Turkey

Federation's Lynn Boykin Hunting Heritage Award in 2016 and the Order of the Palmetto from Governor Nikki Haley in 2016.

His mission has been and remains to ensure that agency decisions and actions regarding the state's natural resources are based on a balance of scientific knowledge, strong conservation ethics, objectivity, fairness, and the needs and interests of the public.

DR. WILLIAM AMBROSE

Vice-Dean, School of the Coastal Environment, Coastal Carolina University

Dr. Ambrose is Vice-Dean of the School for the Coastal Environment and Professor of Coastal Marine Systems Science at Coastal Carolina University. He studies processes influencing the structure and function of marine communities and is particularly interested in how benthic communities and coastal ecosystems respond to climate change. He is a long time Arctic scientist with an extensive research career in Arctic benthic ecology, Arctic environmental change, and Traditional Scientific Knowledge. Before starting his position at Coastal Carolina University, he was Assistant Professor of Biology at East Carolina University, Professor of Biology at Bates College, Fulbright Professor at the University of Oslo, Visiting Professor of Geology at the University of Tromsø, and a program officer at the National Science Foundation.

BARBARA JO BLAIN-BELLAMY

Mayor, Conway, South Carolina

Barbara Jo Blain-Bellamy is a Conway native who recognized at an early age that her assigned work is to serve others. She began a social work career before completing her undergraduate studies, and later centered her law career on relief for the underserved. Her motto is: The best use of God's talents is in service to His people.

Sworn in as Conway's mayor on January 4, 2016, Barbara's contributions as a member of the Conway City Council began in January 1993. She twice served as Mayor-Pro-Tempore, and was the city's deputy administrator in the early 2000's. Barbara has also served on a dozen or so boards and commissions over the past 25 years. Experience and knowledge gained through these and similar positions created for her unparalleled preparation for the mayor's seat. She is currently chair of the board of directors of the PALM Charter School, an executive board member of the Myrtle Beach Regional Economic Development Corporation, and secretary of the board of directors for the Waccamaw Council of Governments.

Barbara earned an Associate's degree from Coastal Carolina University (then, a branch of the University of South Carolina), and bachelor's and master's degrees from USC. At age 46, she began her studies at the USC School of Law and has since practiced criminal and domestic law. Her leadership skills were honed through work in and graduation from Leadership Grand Strand, Leadership South Carolina, the American Leadership Forum, and the Municipal Elected Officials Institute (and Advanced Institute) of Government. She is most proud of being a late-bloomer and lifelong learner. Barbara overcame her fear of everything dark and alone when, at age 55, she hiked for five days in the Blue Ridge Mountains and spent 24 hours in absolute solitude. She later learned to swim at age 60.

Through substitute-parenting and step-parenting, Barbara is the mother of seven and grandmother of five. She and husband Bobby Bellamy are active members of the Friendship

Baptist Church. They enjoy travel (foreign and domestic), bargain-hunting, and cherish every moment spent with their toddler granddaughter, Kennedy. Barbara also enjoys writing, reading, and Sudoku puzzles. She plans to study art history and philosophy.

BRENDON BARBER

Mayor, Georgetown, South Carolina

Brendon M. Barber, Sr., has served on City Council in Georgetown, SC, since 1998. He is a native of Georgetown, and son of the late Eli B. and Camille Moses Barber. An employee for the Georgetown County School District, Barber has held positions as Safe and Drug Free Schools Coordinator, Interim Assistant Principal, Schools Safety Consultant, and is currently a School Counselor and Career Specialist for the district. He is a former Head Basketball and Assistant Football Coach for Georgetown High School. Barber has served as an advisor to the South Carolina Center for Safe Schools - South Carolina Department of Education - State Youth Advisory Board in Columbia, SC, and as a National School Safety Advisor for the US Department of Education.

Barber has been involved with AMIKids, formerly known as Associated Marine Institutes (AMI), on the national level and locally with AMIKids Georgetown, for more than 25 years. He served in numerous positions on the national board and was elevated to Chairman of the National Executive Committee Board. With strong guidance and innovative leadership, Barber paved the way in 2009 for AMI to be re-branded as AMIKids. AMIKids is a \$92 million Non-profit Corporation, with 58 programs in 8 states across the country, dedicated to helping youth with a troubled past develop into responsible and productive citizens. He was also instrumental in helping AMIKids Georgetown raise substantial funds to directly benefit the "Kids" and the program by hosting successful annual Golf Tournaments. Barber currently serves on The SunTrust Commercial Bank Advisory Board, headquartered in Charleston, SC, and has been an active member for more than three (3) years.

A Winyah High School graduate, Barber received the Bachelor of Arts and Master's Degree in Urban Development from Michigan State University in East Lansing, MI, where he attended on a football scholarship. He is a member of St. Cyprian Catholic Church. Barber and his wife Pam live in Georgetown. They are the parents of one daughter a University of Southern California (USC) graduate and three sons, two of whom are Naval Academy graduates. All four are graduates of the Georgetown County School District and have professional careers in California, Nevada and Florida. They are also the proud grandparents of six - 4 grandsons and 2 granddaughters.

REP. HEATHER CRAWFORD

South Carolina Representative

Heather Ammons Crawford grew up along the Grand Strand in Horry County. After graduating from Socastee High School, she went on to earn degrees from Horry Georgetown Technical College and Francis Marion University. As a Young Republican, she has spent a number of years engaging the youth in our community and across the country, having previously served as Chairman of the Grand Strand Young Republicans and also as the South Carolina Committeewoman for the National Federation of Young Republicans. She also served as the

Horry County State Committeeman for the South Carolina Republican Party prior to her service in the South Carolina House of Representatives.

As a pro-life advocate Crawford has enjoyed serving on the board of the Grand Strand Citizens for Life and Coastline Women's Center, spending a considerable amount of time fundraising for LIFE and other conservative causes. Crawford is also an ardent supporter of the Second Amendment, a member of the National Rifle Association, and has co-sponsored numerous pieces of legislation supporting the rights of gun owners in South Carolina. Relating to fiscal matters, Crawford believes that government has an obligation to refrain from spending more than it takes in from the public, always working to ensure that South Carolina continues to maintain a balanced budget.

Representative Crawford was elected to the South Carolina House of Representatives on July 24, 2012, serving District 68 which encompasses the Greater Socastee area of Horry County. She currently serves on the House Ways & Means Committee (the House's budget writing committee), the House Ethics Committee, and holds a seat on the Waccamaw Regional Council of Governments.

Crawford resides in Socastee with her husband Cam, where she is a small business owner and REALTOR. Additionally, Crawford is Founder and President of Your Sister's Closet, a local nonprofit which strives to assist women entering/re-entering the workforce in Horry County.

REP. JEFF BRADLEY

South Carolina Representative

Jeff and his wife Anne have called Hilton Head Island home for 39 years. Their three children - Cooper, Logan, and Griffin - all grew up in Hilton Head Island. A graduate of the University of North Alabama, Jeff works as a financial advisor, helping our neighbors prepare for their future. Jeff's financial experience has helped him lead the fight to lower taxes and reform our overextended state pension system.

Jeff's passion has been to improve education and workforce development in Beaufort County and across South Carolina. Prior to his service in the state House, Jeff founded GED Camp Hilton Head Island, which helps non-high school graduates earn their GED. During his time as our representative in Columbia he has been recognized for his advocacy of school choice and charter schools. Teaching our kids the skills they need to get a job in this changing economy is a majority priority of Jeff's.

GLENN LADISON HAMM, II

Search and Rescue, South Carolina State Guard

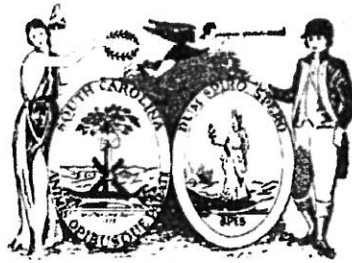
Glenn Hamm is a graduate of The Citadel, The Military College of South Carolina, Class of 2003. He lives in his hometown of Prosperity, South Carolina with his wife, Kim, and twin boys. He is a 4th Generation Owner of Hamm Hardware where he developed and leads the company's industrial and municipal fire and safety products division. Glenn is active in his community as a member of Wightman Church, Chief of Prosperity Rescue Squad, Firefighter at Prosperity Fire Department, Treasurer of Cub Scout Pack 400, and Co-Chairman of the Prosperity Business Association.

Since 2003 Glenn Hamm has served both his community and state in emergency response and emergency management. He is a technical rescue specialist and medical responder with well over one thousand missions in response to emergencies and disasters. He serves the Search and Rescue (SAR) community as a department chief, EMS medical director, military officer, emergency responder, lead instructor, author, technical product specialist, consultant, and speaker. He holds a wide array of national and international certifications in Technical Rescue, Disaster Response, Emergency Management, and Firefighting that include Water Rescue, Public Safety Diver, Underwater Recovery, High Angle Rescue, Wilderness Rescue, Vehicle and Machinery Extrication, Emergency Medicine, Emergency Management, and Structural Firefighting.

In response to the devastating weather systems that have recently affected South Carolina, Glenn Hamm has served South Carolina through The South Carolina Military Department and Adjutant General's Office in The South Carolina State Guard. As a guardsman, Major Hamm served on multiple first wave deployments into heavily affected areas of South Carolina during the devastating storms of Joaquin, Matthew and Florence where he lead Search and Rescue teams and incident management teams as a part of Team South Carolina's response to the devastating effects of the weather systems. During these deployment MAJ Hamm and his team experienced, first hand, the widespread effects of these major weather systems that included the complete destruction of entire towns, overwhelming calls for rescue, and the even the loss of life of fellow South Carolinians. It was during these storms that Hamm gained a keen sense of the many and varied needs for Emergency Response and Emergency Management across the Palmetto State.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

ARTIFICIAL REEF SYSTEMS TASK FORCE

BACKGROUND

Of a total boundary length of 824 miles, South Carolina's **coastline measures 187 miles**. South Carolina's "tidal shoreline" is 2876 miles. NOAA defines the tidal shoreline as including offshore islands, sounds, bays, rivers, and creeks to the head of tidewater or to a point where tidal waters narrow to a width of 100 feet.

The impacts of coastal flooding are substantial and growing given population growth and coastal development. Evidence shows that reefs serve as natural, low-crested, submerged breakwaters, which provide flood reduction benefits through wave breaking and wave energy attenuation. These processes are functions of reef depth and rugosity (seafloor geometry/roughness). The flood reduction benefits of reefs and other coastal habitats are predicted to be high and even cost effective in comparison to traditional approaches.

In June of 2018, the International Journal of Science and Nature published a study "*The global flood protection savings provided by coral reefs*" concluding that "Coral reefs can provide significant coastal protection benefits to people and property. The expected damages from flooding would double, and costs from frequent storms would triple without reefs. For 100-year storm events, flood damages would increase by 91% to \$272 billion without reefs."

Coral reefs provide protection from storms and rising sea level and offer critical support for coastal protection. The effects are comparable to artificial breakwaters that are engineered specifically to dissipate wave energy. Artificial reefs' hydrodynamic features act to reduce incoming waves and alter current patterns and shoreline adjustments behind the artificial reefs. The reef structure buffers shorelines against waves, storms, and floods, helping to prevent loss of life, property damage, and erosion.

Another benefit of artificial reefs, particularly in South Carolina, is the enhancement of the South Carolina coastal marine eco-system thus providing more opportunity for South Carolina fisherman and divers and the fishery industry, recreation, and tourism.

According to the South Carolina Department of Natural Resources, the majority of the continental shelf off the South Carolina coast is covered with sand several feet deep, while only about 5 to 10 percent of the bottom has the appropriate geological makeup to allow for the formation of a reef community. This also results in limited opportunities for fishermen and divers to pursue their interests. To enhance recreational fishing and sport diving opportunities in coastal waters, and to increase the amount of productive hard-bottom habitat available overall, man-made, or "artificial" reefs can be created. This is accomplished by placing suitable long-lived, stable and environmentally safe materials (usually steel or concrete) on a selected area of ocean bottom. Once in place it acts in the same way that naturally occurring rock outcroppings do in providing hard substrate necessary in the basic formation of a live-bottom reef community. When properly designed, located and constructed, man-made reefs can be equally as productive as naturally occurring hard bottom habitats.

Artificial reef development in South Carolina's coastal and offshore waters is currently managed through the South Carolina Department of Natural Resources, Marine Resources Division (MRD). The state's Marine Artificial Reef Program is a part of the MRD's Office of Fisheries Management (OFM). Marine artificial reefs are currently constructed in South Carolina primarily to enhance saltwater fishing opportunities for recreational anglers, and to provide additional locations of interest for the growing number of sport divers in the state. Nearly 20 square miles of ocean bottom are currently permitted for this purpose.

A similar program with similar goals is the rebuilding of depleted oyster reefs with recycled oyster shells such as the Coastal Oyster Recycling and Restoration Initiative (CORRI). Oyster reefs provide structure and food thus increasing other forms of aquatic life. Additionally, the beds control erosion by acting as natural breakwaters along the shoreline.

OBJECTIVES

To design, construct, and install an artificial reef system along the South Carolina Coast which will diminish the effects of coastal flooding while enhancing opportunities for fishing, diving, and tourism.

To seek out and promote similar innovative programs such as the Oyster Recycling and Restoration Initiative to assist in constructing organic breakwaters.

DELIVERABLES

- Expansion of South Carolina DNR, Marine Resources Division's artificial reef program objectives to include construction of artificial reefs for the additional purpose of coast line protection.

- Identification and solicitation of potential stakeholders such as wildlife and fishing organizations, tourist and recreational businesses and industries, and others for assistance in planning and construction of the artificial reefs in coordination with DNR.
- Research of new or existing programs such as CORRI and recommendations for improvement.

TIME FRAME

1Q '19 Inclusion of "coastline protection" as a stated goal for SC DNR artificial reef program.

1Q '19 Education and solicitation of potential stakeholders for assistance in planning and constructing artificial reefs.

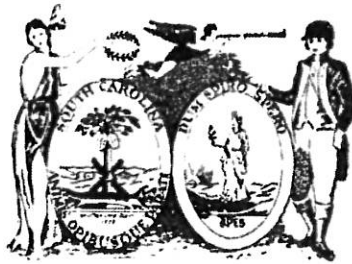
2Q '19 Artificial Reef construction plan (with time line) complete for significant coverage along the SC coast.

2Q '19 Initial artificial reefs deployed with primary objective of shoreline protection.

2Q '19 Recommendations completed for new or existing programs such as CORRI.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

CO-CHAIRMEN LIVING SHORELINE TASK FORCE

ELIZABETH VON KOLNITZ

Chief, Office of Ocean and Coastal Resource Management, SCDHEC

Elizabeth von Kolnitz is the Chief of the SC Department of Health and Environmental Control's Office of Ocean and Coastal Resource Management. She manages and directs the overall functions of OCRM including direct permitting activities, and implementation of the state's coastal zone management program. She serves as a member of the Department's Environmental Affairs management team. She has been with the Department since 2005 and previously served under OCRM's Coastal Service Division developing and implementing special policy and planning initiatives including ocean energy planning, and emergency management planning and coordination.

Before coming to DHEC, Elizabeth worked for the SC Department of Natural Resources' Marine Resources Division as the Assistant Director for Public Affairs. She holds bachelor's degrees in Economics from Clemson University and in Marine Science from the University of South Carolina. She also holds Associate Public Manager and Certified Public Manager credentials from the state's Department of Administration.

DR. PAUL GAYES

Executive Director, Burroughs Chapin Center for Marine and Wetlands Studies, Coastal Carolina University

Dr. Paul T. Gayes is the Executive Director of the Burroughs and Chapin Center for Marine and Wetland Studies at Coastal Carolina University. He has led a diverse array of research initiatives including studies of: coastal geologic framework, relative sea level and coastal response to sea level, storms and beach nourishment, coastal observing modeling-applications and offshore wind energy resource potential and related issues. He has served on professional and technical panels such as: International Geologic Correlation Programme Projects 274 and 367 on Sea

Level and Rapid Coastal Change (UNESCO), Regulatory Task Force for Clean Energy (SC Energy Office), Shoreline Change Advisory Committee (SCOCRM), The SC Shelf Resources Planning Group (SCOCRM), Climate, Energy and Climate Advisory Committee (SC Governor's Office) and many others. He was the lead the Palmetto Wind observation-modeling campaign investigation of offshore wind resource potential as well as a SC - BOEM initiative of geophysical mapping of sea floor habitat and cultural resources off the SC Coast with University of South Carolina and SC State Institute of Archaeology and Anthropology colleagues. He is a core member of Coastal Carolina's HUGO (Hurricane Genesis and Outlook) initiative and lead for the Southeast Atlantic Econet integrating ocean, estuarine, river and atmosphere environmental and dynamic observations and modeling with partners at Florida Atlantic and Clemson Universities and environmental and emergency managers across the region. Dr. Gayes' research has resulted in spending more than three years at sea on various research vessels in the Atlantic, Gulf of Mexico, Pacific and Arctic Ocean providing extended hands-on at-sea experience for more than 600 Coastal Carolina students over the years.

DR. ERFAN GOHARIAN

USC College of Engineering and Computing

Dr. Erfan Goharian's research focuses on water resources systems analysis and integrated management of water resources. He develops complex quantitative and computational models with the purpose of providing enhanced knowledge needed to better understand interactions in coupled human-natural systems and water-energy-food nexus, and how they are shaped by climate, environmental, economic, social and political changes. Before joining University of South Carolina, he was leading the research on re-operation of integrated water systems in California as a part of University of California Water Security and Sustainability Research Initiative (UC Water). Dr. Goharian holds a Ph.D. degree in Civil and Environmental Engineering with emphasize on Water Resources Management from the University of Utah. Beyond his technical background, he has experience working in collaborations across institutions and disciplinary boundaries.

DR. NICOLE ELKO

President Elko Coastal Consulting

Dr. Nicole Elko is President of Elko Coastal Consulting based in Folly Beach, SC; Science Director for the American Shore and Beach Preservation Association (ASBPA); and Executive Director of the South Carolina Beach Advocates. She is presently serving as one of the three civilian members of the U.S. Army Corps of Engineers' Coastal Engineering Research Board (CERB). She received her Ph.D. (Geology) from the University of South Florida after working with the USGS Coastal Marine Geology Program, St. Petersburg, and while serving as the coastal coordinator for Pinellas County, FL.

Dr. Elko has 20 years of experience in coastal science and management. She has managed or assisted with more than 20 beach preservation projects along the U.S. Southeast and Gulf coasts.

DR. ROBERT YOUNG

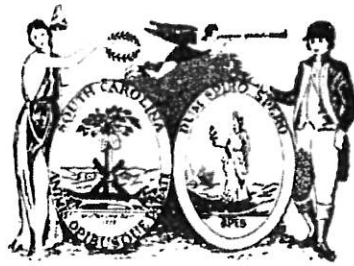
Director, Program for the Study of Developed Shorelines, Western Carolina University
Robert S. Young is the Director of the Program for the Study of Developed Shorelines, a joint Duke University/Western Carolina University venture. He is also a Professor of Geology at Western Carolina University and a licensed professional geologist in three states (FL, NC, SC). The Program for the Study of Developed Shorelines (PSDS) is a research and policy outreach center serving the global coastal community. The primary mission of PSDS is to conduct scientific research into coastal processes and to translate that science into management and policy recommendations through a variety of professional and public outreach mechanisms. The Program specializes in evaluating the design and implementation of coastal engineering projects.

Dr. Young received a BS degree in Geology (Phi Beta Kappa) from the College of William & Mary, and MS degree in Quaternary Studies from the University of Maine, and a PhD in Geology from Duke University where he was a James B. Duke Distinguished Doctoral Fellow. Dr. Young has approximately 100 technical publications and he serves on the Editorial Board of the Journal of Coastal Research and Environmental Geosciences. He currently oversees more than \$3.5 Million in grant-funded research projects related to coastal science and management. Current research projects include: 1) an NSF-funded project examining the coastal impacts of the Elwha River dam removal project; 2) a major scientific effort to restore native rivercane *Arundinaria gigantea* to the southern Appalachians; 3) building a national, geo-referenced storm surge database in partnership with NOAA; 4) a National Park Service funded project to map coastal engineering activities in coastal parks; and 5) working at the local level to help communities plan for rising sea level.

Dr. Young is a frequent contributor to the popular media. He has written numerous articles for outlets like the New York Times, USA Today, Architectural Record, the Houston Chronicle, and the Raleigh News and Observer, among others. He is co-author of *The Rising Sea* and co-editor of *Geologic Monitoring*, both released in 2009. Finally, Dr. Young has testified before congress and numerous state legislatures on coastal issues. He currently serves the State of North Carolina as a member of the Coastal Resources Commission Science Panel and the State of South Carolina as a member of the Blue Ribbon Committee on Shoreline Management. He is President of Sialia Environmental, Inc— a firm that provides environmental consulting and restoration design.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

LIVING SHORELINE TASK FORCE

BACKGROUND

Living shorelines are nature-based approaches for shoreline protection. These stabilization techniques not only protect shorelines and infrastructure, they also conserve, create or restore natural shoreline habitats and ecosystem services. Living shoreline projects can be installed on tidal shorelines as well as freshwater ponds and lakes wherever erosion is a problem. Many shorelines are highly suitable for living shoreline practices depending on the location, land and water uses, erosion and flood risk, and other factors.

Living shoreline management practices protect and enhance natural shoreline habitat and coastal processes through the strategic placement of plants, stone, sand fill, and other structural and organic materials.

Both beautiful and practical, living shorelines add attractive, low-maintenance green space and focal points for people to gather. Their services to the environment (which also benefit people) include purifying water, buffering floods, reducing erosion, storing carbon, and attracting wildlife to habitat.

Evidence shows that during major storms, a living, natural shoreline performs better than a hardened shoreline. Installation and maintenance tend to be more cost efficient per linear foot annually than hard shoreline structures.

Typical Living Shoreline Treatments:

Vegetation Only – Provides a buffer to upland areas and breaks small waves. Suitable only for low wave energy environments.

Edging – Added structure holds the toe of existing or vegetated slope in place.

Sills – Parallel to existing or vegetated shoreline, reduces wave energy and prevents erosion. Suitable for most areas except high wave energy environments.

Breakwater – Offshore structures intended to break waves, reducing the force of wave action, and encourage sediment accretion. Suitable for most areas.

OBJECTIVES

Erosion Reduction

Impact Absorption

Improve Marine Habitat and Spawning Areas

Provide Attractive Natural Appearance

Improve Water Quality

Filter Storm water Runoff and Groundwater

Maintain Coastal Processes

DELIVERABLES

- Site analysis: Determine whether living shoreline stabilization is appropriate in a particular area. This analysis includes an evaluation of the bank erosion rate and elevation, wave energy, prevailing wind and wave direction, vegetation, and soil type. Design of restoration activity begins after the site analysis.
- Permit approval and legal compliance.
- Site preparation: The site is cleared of debris and unstable trees, and failing seawalls and bulkheads can be removed. Any runoff issues should also be identified and addressed prior to material installation.
- Installation: Typical living shoreline treatments include planting riparian, marsh, and submerged aquatic vegetation; installing organic materials such as bio-logs and organic fiber mats; and constructing oyster reefs or “living breakwaters” that dissipate wave energy before it reaches the shore.
- Post-construction monitoring and maintenance: This includes scientific monitoring of restored habitat to gather information on the success of the project. Maintenance activities include debris removal, replanting vegetation, adding additional sand fill, and ensuring that the organic and structural materials remain in place and continue to stabilize the shoreline.

TIME FRAME

2Q '19 Recruitment of community volunteers to provide an informed review of living shoreline strategy and development

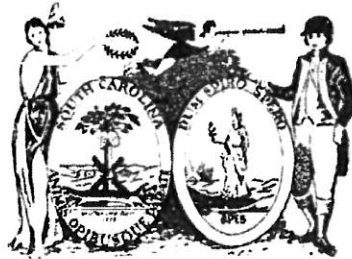
2Q '19 Development of network systems and communication strategies throughout the state of South Carolina

3Q '19 Completed analysis and assessment of shoreline zones suitable to sustain such viable remedy.

4Q '19 State-wide living shoreline maintenance complete with recommendations for improvement.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

CO-CHAIRMEN INFRASTRUCTURE & SHORELINE ARMORING TASK FORCE

CHRISTY HALL

Secretary, South Carolina Department of Transportation

Secretary Hall, a Professional Engineer, has more than two decades of service at the South Carolina Department of Transportation (SCDOT). She began her career in Road Design and held numerous management positions including Program Manager, District Construction Engineer in District 3, based in Greenville, and District Engineering Administrator in District 2, based in Greenwood.

An Abbeville native and a 1989 graduate of Calhoun Falls High School, Hall graduated from Clemson University in 1994 with a bachelor of science in civil engineering. Hall had been serving as the Acting Secretary of SCDOT since July 2, 2015, and led the agency during the preparation, response and aftermath of the 1,000-year flood in fall 2015. Governor Nikki Haley announced the appointment of Hall as Secretary of Transportation on Oct. 21, 2015.

Secretary Hall had previously served the agency as Deputy Secretary for Engineering since May of 2014. In that position, she was responsible for managing all engineering operations in support of SCDOT's approximately \$1.5 billion program.

In 2014, Hall served a term as Acting Secretary of Transportation from February to May, directing the agency during the winter storm and earthquakes of 2014. She previously held the position of Deputy Secretary of Finance and Procurement from 2011-2014.

DR. RICH VISO

Director, School of Coastal and Marine Systems Science, Coastal Carolina University

Dr. Rich Viso is the Assistant Director of the School of Coastal and Marine Systems Science, Coastal Carolina University. Dr. Viso received his B.S. Degree from Virginia Tech in 1995, his

M.S. degree from West Virginia University in 1999, and his Doctorate from the University of Rhode Island in 2005.

His research interests include seafloor imaging, submarine groundwater discharge and plate tectonics.

He currently teaches Applied Geophysics, Coastal Marine and Wetland Process and Applied Geophysical Field Methods at Coastal Carolina University.

His many publications include:

Constrained Enrichment Contributes to Hypoxia Formation in Long Bay, South Carolina (USA), an Open Water Urbanized Coastline, Marine Ecology Progress Series, 461:15-30, doi:10.3354/meps09796. (Co-author)

Radon as an indicator of limited cross-shelf mixing and submarine groundwater discharge in a coastal embayment along the South Atlantic Bight. Continental Shelf Research, 31 (12), 1306-1317. (Co-author)

Geological Controls on Submarine Groundwater Discharge in Long Bay, SC, (USA). Continental Shelf Research (2010), doi:10.1016/j.csr.2009.11.014. (Co-Author), and

Impact of the Charleston Ocean Dredged Material Disposal Site on nearby hard bottom reef habitats. Mar. Pollut. Bull. (2010), doi:10.1016/j.marpolbul.2009.12.007 (Co-Author).

BRYAN P. STIRLING

Director, South Carolina Department of Corrections

Bryan P. Stirling is the director of the South Carolina Department of Correction. Stirling has served as acting director since October 2013. He is responsible for a staff of nearly 5,700 employees across 26 penal institutions. Before joining the SCDC, Stirling served as chief of staff for Governor Nikki Haley. Prior to joining Governor Haley's staff, he was South Carolina's Deputy Attorney General from 2006 to 2012. Stirling has also worked in two private law firms, McAngus Goudelock and Courie LLC and Tompkins and McMaster LLC before entering state government.

KIM STENSON

Director, South Carolina Emergency Management Division

Kim Stenson has served as the Director of the SC Emergency Management Division since 2013. The Division provides oversight and coordination for emergency and disaster consequence management planning, and response and recovery operations for the State of South Carolina. Mr. Stenson is also responsible for coordination with emergency managers at the local and national levels.

Prior to joining SCEMD in 1998, Mr. Stenson served as an infantry officer in the U.S. Army. Following his retirement from the U.S. Army, Mr. Stenson joined SCEMD, where he served successively as the Manager, Natural Hazards Plans; Chief, Preparedness; Chief, Preparedness and Recovery; and Chief of Staff, an appointment in 2008. He has been a key player in the Division's responses to major events, most notably for Hurricane Matthew in October 2016 and the October 2015 heavy rains and severe flooding incident which resulted in the largest statewide responses since Hurricane Hugo in 1989.

Mr. Stenson received a Bachelor of Arts in Political Science from Washington and Lee University in 1975 and a Master of Arts in history from Norwich University in 1987.

Director Stenson currently serves as Chairman of the State Emergency Response Commission, Chairman of the Public Health Emergency Plan Committee, Chairman of the NEMA Radiological Preparedness Subcommittee, Vice Chairman of the Firefighter Mobilization Committee and is a member of the Homeland Security Advisory Committee.

JAY FAISON

Founder and CEO of ClearPath Foundation

Jay Faison is the founder and chief executive officer of the ClearPath Foundation, whose mission is to accelerate conservative clean energy solutions. Faison is also a founder of SnapAV, a high-growth company that designs and distributes more than 2,000 audio-video related products to technology integrators worldwide.

A serial entrepreneur, Faison started, managed and sold two businesses prior to SnapAV and won the 2013 Ernst and Young Entrepreneur of the Year award for the Southeast region.

Faison graduated with a degree in economics from the University of North Carolina at Chapel Hill and received his master's degree in business administration from the University of Virginia's Darden School of Business.

SEN. STEPHEN GOLDFINCH

South Carolina Senator

Stephen L. Goldfinch, Jr. currently serves in the S.C. Senate from District 34 (portions of Horry, Georgetown and Charleston counties).

A leader who will utilize his business skills, knowledge, and experience, Stephen is a conservative reformer. His political philosophy is simple:

- the foundational principles of the Constitution guide every political decision.
- government is best when government is least.
- government taxes too much, spends too much and must be limited in their scope and influence.
- decisions should be made locally and closest to the people.

Stephen is working to make South Carolina more competitive and viable. His main goals in the senate include:

- bring meaningful, higher-paying jobs (including technical jobs) to District 34.
- fundamentally and comprehensively reform our tax system.
- fight for key infrastructure and roads needs of District 34.
- expand economic opportunity for everyone.
- reform our public schools by encouraging choice and competition.
- encourage County and State governing bodies to run more efficiently.
- create an environment that helps families and small businesses become stronger and more stable.

Stephen practices civil litigation, criminal litigation, real estate, estate planning, and business law in Murrells Inlet and is a founding partner at the firm of Goldfinch Winslow, LLC.

EDUCATION AND WORK

Stephen grew up in Murrells Inlet and earned a degree in Biology from The Citadel where he graduated with honors; Dean's list, the President's list, and the Commandant's list. He also received a Masters in Business Administration from the Citadel and earned his Law degree from The Charleston School of Law in 2010.

FAMILY AND PERSONAL LIFE

Stephen is a native South Carolinian. He is the son of Stephen Goldfinch Sr. and Patricia Briggs. He is married to Renee and they have a daughter, Hadlee Edwards and a son, Tripp.

Stephen and Renee are active in their community, and committed to service, their neighbors, the public, and their growing family. They attend Surfside Presbyterian Church.

Avid outdoors people, Stephen and Renee enjoy traveling—with a special fondness for the Southern Africa area where they have served to distribute humanitarian aid and minister to needy children.

Stephen has been involved with the Awendaw Community Action Group, the Murrells Inlet 2020 Community Revitalization Group, Helping Hands of Georgetown and Junior Achievement. Stephen is a licensed pilot, boat captain, master scuba diver and long-time fishing enthusiast who wants future generations to be able to enjoy the local waterways for years to come.

Other Civic Involvement

- Chairman, GSATS (Grand Strand Area Transportation Study Committee)
- Chairman, the Georgetown County Legislative Delegation
- Chairman, the Wildlife and Natural Resources Committee of the Charleston Delegation
- Captain, SC Guard (tasked as a Jag Officer and a Search and Rescue Diver)

REP. WILLIAM COGSWELL

South Carolina Representative

Rep. Cogswell is a graduate of the University of the South and holds a master's degree from Columbia University. He has owned his own business for 20 years. He specializes in complex historic and environmentally contaminated rehabilitation projects. Cogswell has received numerous local, regional, and national awards for projects like the Cigar Factory, and is proud of the work they are doing at the GARCo Mill and on the Old Navy Base in North Charleston. He is a well-known conservationist and has had the honor to serve on numerous boards including Historic Charleston Foundation, the Peninsula Advocacy Commission, and the Library Society. He enjoys history, hunting, and being on the water. He and his wife Lucile have been happily married for over 15 years. They have two children- Mason (13) and Meade (11) and are members of Grace Church where he was baptized and confirmed.

- Real Estate
- Residing at 26 Gibbes Street, Charleston
- Born January 14, 1975 in Charleston
- Son of the late W.S. Cogswell, and Edmund and Sarah Aichele Cogswell Rhett
- University of the South-Sewanee, B.A., 1997
- Columbia University, MSRED, 2003
- September 21, 2002 married Lucile Lampton, 2 children, W. Mason and Meade Hamlin
- Historic Charleston Foundation Board, 2009-, Advocacy Chairman, 2016-

- Peninsula Adv. Comm, 2010-, Chairman, 2016-
- Member, Grace Episcopal Church

ALAN WILLIAMS

Academic Program Manager, Trident Technical College

Mr. Williams is a faculty member at Trident Technical College and an adjunct faculty at the Citadel. He teaches Criminal Justice and Homeland Security courses and was the principle developer of the first Homeland Security Management Associates degree in the State of South Carolina. Mr. Williams currently serves as the Academic Program Manager for the Homeland Security Management Degrees at Trident Technical College.

From 2012 to 2017 he taught and administered a series of classes on homeland security to Transportation Security Administration Officers in five states (SC, NC, TN, AL, and MS). Prior to this Mr. Williams was a Police Sergeant with the North Charleston Police Department where he served in various positions including Homeland Security Coordinator, Project Seahawk and Harbor Patrol Supervisor, Patrol Supervisor, Detective, Arson Investigator, SWAT Command Post operator, and Accreditation Manager. He served on the multi-discipline Chemical, Ordnance, Biological, Radiological (COBRA Team) and was trained as an OSHA Certified Hazardous Materials Technician. Mr. Williams authored the City of North Charleston's Emergency Operations Plan. He has responded to a variety of critical incidents such as search and rescue missions, barricaded subjects, suspicious package calls, biological and chemical hazard calls. He is a certified Instructor in Incident Command System, and Law Enforcement Response to Terrorist Bombings, and Law Enforcement Response to Weapons of Mass Destruction. He has graduated from numerous other homeland security and law enforcement courses. Mr. Williams has two master's degrees. The Citadel Graduate College-Master of Arts in Social Science with Graduate Certificates in Homeland Security and Leadership and Charleston Southern University Master in Science Criminal Justice. He obtained his Bachelor of Science degree in Management of Human Resources from Southern Wesleyan University. Mr. Williams has received numerous civilian awards over the years. The South Carolina Criminal Justice Academy J.P. Storm Award (1996), VFW Post 3142 Police Officer of the Year (1998) and North Charleston Police Officer of the Year (2002).

Williams enlisted in the South Carolina State Guard in May of 1988 and retired from the State Guard with the rank of Brigadier General. Within the last three years then Williams has been activated for Hurricane Joaquin floods (2015), Hurricane Matthew (2016) and Hurricane Irma (2017) for periods of up to 9 days. During Hurricane Joaquin floods then Williams directed operations for over 500 personnel accomplishing tens of thousands of man-hours worth of volunteer work. Williams was the principle author of the Rapid Response Team Concept and Strategic Plan. Military Education includes United States Air Force Squadron Officer's School and Inland Search and Rescue Coordination Course, the South Carolina State Guard Senior Officer Course, Captain's Career Course, Officer Basic Course. Williams has been awarded the SC State Guard Distinguished Service Medal, Medal of Merit (4 awards), Meritorious Service Medal (2 awards), Commendation Medal, Individual Achievement Ribbon (3 awards), Good Conduct, Longevity Service, Federal Service School, Humanitarian Service, Service, Military Readiness, and Military Proficiency ribbons.

SEL HEMMINGWAY

Georgetown County Administrator

Henry Edsel "Sel" Hemingway Jr. is a native of the Town of Andrews in western Georgetown County. He has served as Georgetown County Administrator since 2008 and was Georgetown County Council Chairman for eight years prior to that. He served a total of 11 years on the council, following in his father's footsteps. He and his wife, Kathy, have four children and 14 grandchildren, and continue to reside in Andrews.

Hemingway is the oldest of five children of Edsel and the late Anne Rhem Hemingway of Hemingway. He is a graduate of Clemson University and is a licensed Certified Public Accountant. He managed the family's Ford dealership until April 2008 when he resigned to become the County Administrator for Georgetown County.

Hemingway has been involved in a number of civic activities in addition to his time on County Council. He served two terms as President of the Andrews Rotary Club; was chairman of the Georgetown County United Way Campaign; Chairman of the Georgetown County Economic Development Commission; and President of the Andrews Industrial Development Corporation. He is a member of Trinity United Methodist Church, where he teaches Sunday School and serves as a certified Lay Speaker.

Hemingway enjoys all outdoor activities including hunting, fishing, camping and golf. He regularly attends Clemson football and basketball games with his family, especially his grandsons. He also enjoys portraying the character, Forest Gump, in a manner that elicits laughter, tears and profound thought from his audiences.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

INFRASTRUCTURE & SHORELINE ARMORING TASK FORCE

BACKGROUND

This task force will focus on drainage and flow infrastructure as well as shoreline armoring.

Drainage Infrastructure

Every community has a drainage system, either natural or human-made or, more likely, a combination of both. The drainage system carries surface water from where it falls through channels to a receiving body of water. Drainage improvements will result in a reduction in overall flooding problems.

Urban or human-made channels are different from the natural channels. Human-made channels may need more maintenance to provide proper conveyance. To function properly, it is necessary that they be kept clean and clear. The urban drainage system also includes storm sewers (i.e., pipes) that carry smaller flows underground. When storm sewers work, the streets and yards are drained quickly. Storm sewers won't work when they are blocked. Blockages can be caused by debris at the inlet, an outlet or outfall that is under water, a broken pipe, or debris or sediment in the pipe. The purpose of drainage ditches and storm sewers is to safely convey water downstream.

A community's drainage system covers a large area and includes storage basins, stream channels, backyards, swales, ditches, and culverts. A regular program of drainage system inspections can catch problems in the system before they turn into major obstructions. Such inspections and follow-up work for the whole drainage system are critical to maintaining a properly functioning drainage system.

A community's maintenance program should include:

Inspection of the entire drainage system at least once each year;

A check of known problem sites during or immediately after heavy storms;

Responding to inquiries or complaints from citizens; and
Removing debris soon after it is found.

Involving the citizens will be very helpful. While they may not do any maintenance (especially removing large logs or obstructions), citizens are the eyes and ears of the community and can look out for and report problems before they cause a flood. Volunteers may also clear minor blockages before they become major obstacles. Some communities have organized “stream teams” that regularly monitor assigned sections of rivers.

Shoreline Armoring

This task force will further consider shoreline armoring and stabilization by utilizing site specific methodologies that balance the needs of manmade protection and that of natural systems.

Hard armoring has been the traditional approach to shoreline protection. This includes the construction of bulkheads, seawalls, and other barriers. Areas with considerable development & critical infrastructure may require hard armoring to protect against coastal flooding & erosion. These practices can allow for continued use of a developed area, even as sea levels rise. However, armored shorelines have a number of potential drawbacks to consider. As such, localities should carefully consider where to implement hard armoring.

The goal for shoreline armoring for flood hazards is to promote public health, safety and general welfare by minimizing public and private losses due to flood conditions in specific areas and by maintaining and restoring natural flow patterns. Flood management armoring should be located, designed, constructed and maintained to protect: the physical integrity of the shoreline and properties that may be damaged by alterations to the geo-hydraulic system; water quality and natural groundwater movement; fish, vegetation and other life forms and their habitat vital to the aquatic food chain; and recreation resources and aesthetic values such as point and channel bars, islands and other shoreline features and scenery.

OBJECTIVES

To reduce the vulnerability of localized flooding by maximizing the effectiveness of flow infrastructure for water drainage.

To utilize community volunteers to assist in infrastructure maintenance and inspection.

To minimize coastal flooding utilizing “armoring” through the careful use of site-specific methodologies that balance the needs of manmade protection and that of natural systems.

DELIVERABLES

- Identification of culverts, ditches, and other existing water drainage and flow infrastructure in need of maintenance.
- Clearing of existing drains and culverts of sediment and debris.
- Identification of drainage areas in need of enhancement and recommended solutions.
- Prioritization and recommendations to bring the infrastructure to full functioning capacity.

- Solicitation and creation of community volunteer groups to assist in inspection and mediation of infrastructure.
- Identification and implementation of sediment management strategies in drain and culverts
- Identification and replacement of undersized culverts.
- Identification and mitigation of drainage issues resulting in ponding.
- Review and recommendations for South Carolina shoreline areas which may benefit from armoring while considering site-specific stabilization methods that balance the needs of the public with the needs of the natural system.

TIME FRAME

1Q '19 Development of messaging and communication of Infrastructure program to South Carolina communities, cities, towns and counties.

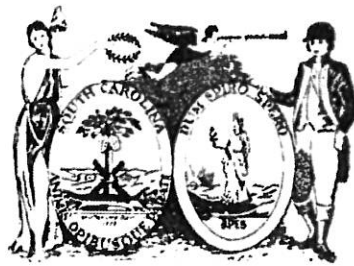
2Q '19 Recruitment of community "volunteers" to assist in infrastructure inspection and mediation.

2Q'19 Completed review of SC shoreline areas for consideration of armoring for flood protection with recommendations.

3Q'19 State wide infrastructure maintenance complete with recommendations for improvements.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

CO-CHAIRMEN

SMART RIVER & DAM SECURITY TASK FORCE

DR. LEONARD PIETRAFESA

Research Scholar, Coastal Carolina University

Dr. Pietrafesa received his BS in 1965 from Fairfield University (Fairfield, CT) Physics & Mathematics. In 1967 he received his MS from Boston College/University of Chicago (Boston, MA/ Chicago, IL) Geophysical Fluid Dynamics (MS awarded from BC with concurrence from UC). In 1973 he received his PhD from the University of Washington (Seattle, WA) Geophysical Fluid Dynamics Physics. His Dissertation: Baroclinic Circulation and Air-Sea Interaction on a Continental Margin.

Dr. Pietrafesa's areas of interest include Observations of and Numerical Modeling of Atmospheric, Oceanic, Estuary, Land and Hydraulic Inter-Actively Coupled Systems; Relationships between Climate and Weather Coupled Systems; Wind-Wave Current Coupled Interactions; Precipitation and River Discharge; Climate Conditions and Weather Events; Climate, Weather and Human Health; Science and Public Policy; Developing Non-Linear, Non-Stationary Data Adaptive Data Decomposition Methodologies for Analyses; Sea Level Variability and Rise; Physical Weather and Climate Factors Affecting Biotic Systems, especially fish distributions; Sunspot Variability; Western Boundary Current Dynamics; Mid-Latitude Atmospheric Storm Formations; Oceanic Heat and Climate; Tropical Cyclone Frequencies of Occurrence and Intensification; Building the Essential Integrated Ocean-Atmospheric Observing System; Assessing Renewable Energy in Coastal Zones via Observations and Modeling; Creating a Renewable Energy Forecast System; Diversifying Student Under-Graduate and Graduate Programs; Building Industry-Government Academia Enterprise Partnerships.

Dr. Pietrafesa was employed from 1965-1968 at Weston Geophysical Engineers and Weston Geophysical Research, Boston, MA; and Ktech Corp. 2009-2011. He was an Industry Consultant from 1975-2008, Environmental Research & Technology, Science Applications Inc, JAYCOR, Information Systems Lab Inc., Air-Dat Inc.

His academic experience includes:

1/2010- Burroughs & Chapin Scholar, Coastal Carolina University 7/2008- Professor Emeritus, North Carolina State University 1/2004- 6/2008 Associate Dean, External Affairs, PAMS/NCSU 12/2000- 12/2008 Executive Director, Office of External Affairs, PAMS/NCSU 6/1989-12/2000 Head, Dept. of Marine, Earth and Atmospheric Sciences/NCSU 5/1988-8/1989 Associate Dean, Research, PAMS/NCSU 5/1989-8/1989 Acting Dean, PAMS/NCSU 7/1988-6/1990 Director, University Honors Council/NCSU 7/1992-12/1996 Director, Southeast University Consortium for Severe Storms 7/1981- 6/2008 (approved 1/1981) Full Professor, Department of Marine, Earth & Atmospheric Sciences, NCSU 7/1976 – 6/1981(approved 1/1976) Associate Professor with Tenure, Depts. of Geosciences and Marine Science & Engineering 7/1973 –6/1976 Assistant Professor, Depts. of Geosciences and Marine Science & Engineering., NCSU.

DAVID WILSON

Director, SC DHEC

David Wilson is the Acting Director of the South Carolina Department of Health and Environmental Control. He was appointed by the Board of Health and Environmental Control, and assumed his duties as Acting Director in August 2017.

Wilson has been a member of the DHEC team for more than 30 years, playing key leadership roles in several areas. Most recently, Wilson was the senior director of Legislative Affairs, serving as the agency's liaison to the S.C. General Assembly, as well as coordinating and communicating agency policy.

Wilson also previously served as chief of the agency's Bureau of Water and was the interim director of legislative affairs for Environmental Quality Control.

Wilson has represented DHEC on numerous national and state environmental initiatives including serving as the S.C. governor's representative on the National Governors Association Federal Facilities Task Force. Wilson has a bachelor's degree and a master's degree in civil engineering from the University of South Carolina. He is a registered professional engineer.

MAJOR GENERAL ROBERT E. LIVINGSTON, JR.

South Carolina Adjutant General

Major General Robert E. Livingston, Jr. serves as the head of the Military Department of the state of South Carolina. He administers the affairs of the South Carolina Army and Air National Guard, the Emergency Management Division, the State Guard, and the Youth Challenge Academy. The Governor, by law, is the Commander-in-Chief. The Adjutant General is a Constitutional Officer and has the rank of Major General (MG).

MG Livingston's military service began when he enlisted in the South Carolina Army National Guard in March 1978. His military education started with his completion of the U.S. Army Infantry School in 1978, followed by Airborne School in 1979. He was commissioned through the Palmetto Military Academy, Officer Candidate School in 1980 as the Distinguished Honor Graduate. MG Livingston commanded Task Force 218 in support of Operation Noble Eagle from June 2004 to January 2005. From May 2007 to April 2008, he commanded Combined Joint Task Force Phoenix (VI) in Afghanistan where he was responsible for the training, mentoring, and

advising of the Afghan National Security Forces. His next assignment was Director for Strategic Plans and Policy (J5), National Guard Bureau, Arlington, Virginia. His last assignment was as Director, J5 Coalition Coordination Center, United States Central Command, MacDill Air Force Base, Florida where he was responsible for facilitating the exchange between the Command Staff for the United States Central Command and Military Senior National Representatives from over 60 countries. He was also charged with providing deployment support for Coalition Countries within the United States Central Command Area of Responsibility. Since January 2011, MG Livingston has served as The Adjutant General of South Carolina and serves as the last elected Adjutant General for the state of South Carolina.

In 2009, MG Livingston was presented the Sergeant William Jasper Freedom Award for his leadership and in December of 2016, he was presented the Order of the Palmetto, the highest civilian honor in the state. MG Livingston is married to Barbara Flora Livingston and they have four children, and five grandchildren.

Livingston is President, Chief Executive Officer, and Owner of Gregory Electric Company, Incorporated, headquartered in Columbia, South Carolina. Gregory Electric Company is a provider of complete commercial and industrial electrical, utility and telecommunications services with operations in nine states.

DR. HANIF CHAUDHRY

USC College of Engineering and Computing

Dr. Chaudhry's area of specialization is water resource engineering with emphasis on the mathematical and physical modeling of steady and unsteady flows in closed conduits and open-channel. The research interests include both numerical and experimental investigations, such as modeling and laboratory studies on fluid transients in pipelines, on flood flows in rivers and channels, on levee breach, dam failure, and on scour around bridge piers, etc.

Dr. Chaudhry received her BS in Civil Engineering from University of Engineering and Technology, Lahore, Pakistan, 1965, her MS in Hydraulic Engineering from the University of British Columbia, Vancouver, Canada, 1968, and her Ph.D. in Hydraulic Engineering from the University of British Columbia, Vancouver, Canada, 1970.

DR. INTHUORN SASANAKUL

USC College of Engineering and Computing

Dr. Sasanakul is an Assistant Professor in the Civil and Environmental Engineering Department of the College of Engineering and Computing at the University of South Carolina. She received her Bachelor of Science degree from Thammasat University in 1998, her Masters of Science degree from the Asian Institute of Technology in 2000, and her Doctorate degree from Utah State University in 2005.

Dr. Sasanakul was a recipient of "ASTM Hogentogler Award of 2012". She also received prestigious awards from the U.S. Army Corp. of Engineer including the "Commander's Award of Public Service" with accompanying medal from the Chief U.S. Army Corps of Engineers in appreciation for the support of New Orleans Recovery through efforts of the Evaluation Task Force of the Hurricane Katrina Interagency.

DUKE BRANTLEY

Acting Director, Earth Sciences and Resources Institute – USC

Duke Brantley is the Associate Director of ESRI-SC and has been with the University of South Carolina for over 12 years. His research areas include: geologic characterization, CO₂ sequestration, numerical modeling, reservoir simulation, hydrogeology, geophysical data acquisition, and water quality monitoring and analysis. Duke has a M.S. in Earth and Environmental Resource Management, a M.S. in Geological Sciences, and a Ph.D. in Geological Sciences. Prior to ESRI-SC, Duke cultivated his interest in science with AmeriCorps in Atlanta, GA. During his AmeriCorps service with Southeast Waters Org., Duke's work focused on surface water quality with project partners that include: EPA, USFS, City of Atlanta, Georgia Conservancy, CRBI, Oglethorpe University and the Upper Chattahoochee River Keeper among many others.

Duke earned an undergraduate degree in business from Presbyterian College which served him well while he was a stockbroker for two years prior to pursuing his interest in science. Duke still has a keen interest in business and feels that his scientific expertise, combined with a business background, will prove to be a unique combination that is especially valuable in the energy and environmental arenas. Duke understands the significance of considering economics and business management when conducting scientific research.

SEN. KENT WILLIAMS

South Carolina Senator

- Deputy County Administrator
- Born September 15, 1960 in Marion
- Son of James and Thelma Howard Williams
- Florence Darlington Technical College, A.S., 1981
- South Carolina State University, B.S., 1987
- Independence Federal Savings and Loan Bank, Washington, D.C., 1985-1986
- South Carolina State University, 1986-90
- Clemson Extension Service, 1990-1999
- Chairman, Marion County Board of Education, 1998-04
- Marion County March of Dimes, Co-Chairman, 2003
- Governor Carroll Campbell appointee to South Carolina State Agricultural Commission
- Twelfth Judicial Circuit Youth Council Board
- Marion County Duke Endowment Board
- Rural Community Development Board
- Pee Dee Advisory Board, Wachovia Bank
- Member & steward, St. James A.M.E. Church
- Healthcare Foundation Board

REP. RICHIE YOW

South Carolina Representative

Richie Yow was born and reared in charming, historic Cheraw, South Carolina. He grew up in the shadow of his granddaddy's store, Lloyd Jones' Grocery. His family, Reverend Wade Miles and

the people of his community helped instill in him a love of God, country and the knowledge that OUR GREATEST TREASURE AS AMERICANS, IS OUR FREEDOM.

Richie's dad, Ricky Yow, passed on his love of nature and the outdoors to Richie. He made sure that he understood how to be a good steward of our God-given resources. Richie continues to be active with the National Wild Turkey Federation and is also a member of the National Rifle Association.

When Richie was in the 6th grade, he went to work at Pee Dee Farm supply and worked there until he graduated from Cheraw High School. While working there under the tutelage of his grandma, Louise Jones, and Mr. Jimmie Funderburk, he learned firsthand about work ethic, the value of a dollar and a commitment to doing the right thing. During his formative years, Richie enjoyed the advantage of learning lifelong lessons from staunch, conservative South Carolinians.

At the age of 17, Richie joined the United States Air Force. He is now an Air Force Veteran and a current full-time member of the Air National Guard. As an expert in the installation and operation of Aircraft Arresting Systems, Richie has participated in the largest air shows in the country featuring the Air Force Thunderbirds and the Navy Blue Angels.

Richie's educational opportunities were also extended via his Air Force and Air National Guard assignments. Richie has completed curriculums offered by The War College (SEJPME), the Milwaukee School of Engineering and the U.S. OSHA Safety School. He also received a degree in Engineering Infrastructure from the Community College of the Air Force. Richie is a lifetime member of the National Guard Association.

Richie has served with distinction throughout his military career. His numerous deployments include Qatar/Oman, Kuwait/Saudi Arabia, Bahrain/Saudi Arabia/, Antigua, Canada, St. Croix and Louisiana following Hurricane Katrina. His many awards and commendations include 6 Air Force Achievement medals, 2 Air Force Outstanding Unit Awards with the Valor Device, 6 Air Force Reserve Forces Meritorious Service Medals, the National Defense Service Medal, 2 Southwest Asia Service Medals, an Air Force Overseas Short Tour Ribbon, 2 Air Force Longevity Service Medals, 2 Armed Forces Reserve Medals, the Louisiana Emergency Service Medal, the North Carolina National Guard Achievement Medal, the South Carolina Meritorious Service Medal, the South Carolina Palmetto Service Medal and the coveted Air Force Commendation Medal.

Richie is married to the former Crystal Wallace of Cheraw and they have one son, RJ, who is 15. Crystal and RJ, always supportive of Richie's endeavors, have been especially so concerning Richie's civic undertakings. When Richie decided it was time to help conservative Republicans seek and attain public office, with his family firmly behind him, he totally committed his time and energy to making a difference. He became the first resident of Chesterfield County to represent the 5th Congressional District as it's GOP Chairman. As chairman, Richie was not only very instrumental in getting Mick Mulvaney to run for Congress, he also played an important role in his being elected. Mick was the first Republican Congressional candidate in our district to win Chesterfield County. Now, Richie Yow intends to win State House Seat 53 and again make history by becoming the first Republican to do so.

JEFFREY ALLEN

Director, South Carolina Water Resources Center, Clemson University

Jeff is the Director of the South Carolina Water Resources Center at Clemson University. Jeff previously served as the Interim Director of the Strom Thurmond Institute of Government and Public Affairs. His work with the SCWRC involves coordinating water research with a national network of water institutes and identifying and pursuing critical water research needs for South Carolina. Jeff has served as the principle investigator on multiple grants from federal, state and local government agencies as well as private foundations. He has served on numerous regional and state committees and advisory councils, most recently on the Carolinas Integrated Sciences and Assessments Advisory Board, the Duke Energy Water Fund Board, the South Carolina Shoreline Change Advisory Council, and the Savannah River Basin Advisory Council. He has organized and sponsored several state-wide meetings on GIS mapping and water resources and is currently the Chairman of the SC Water Resources Conference. He is a past-president of the National Institutes for Water Resources (NIWR) and served for three years on the NIWR Executive Board. Prior to coming to the Thurmond Institute and the SCWRC, he worked for the S.C. Wildlife and Marine Resources Department in Columbia, SC and Clemson University's Regional Resources Development Institute.

MARGUERITE MCCLAM

Palmetto Consulting Engineering Group

Marguerite McClam is the President and Owner of the Palmetto Consulting Engineering Group, Inc. She has been involved in numerous multi-million dollar projects such as Carolina Bay's, Santee Reach Water Transmission Main, and Barefoot Mine.

McClam has been an instrumental and important volunteer of MathCounts at the National, State, Chapter, and School levels. Acting as the Columbia Coordinator, SC Coordinator, National Head Scorer, and sitting on the MathCounts National Board of Directors. MathCounts is an organization that hopes to provide fun and challenging math programs for US middle school students to increase their academic and professional opportunities. She is also the recipient of the SCSPE Young Engineer of the Year Award in 1998 and 12 years later received the SCSPE Engineer of the Year in 2010. She is a Clemson University graduate where she earned her Bachelor's of Science in Civil Engineering in 1992.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

SMART RIVER AND DAM SECURITY TASK FORCE

BACKGROUND

An important step in better managing our flood mitigation plan is to effectively combine datasets and multiple model inputs and outputs, such as data collected through LIDAR and other studies, for an enhanced understanding of our complex river and dam systems. LIDAR, which stands for Light Detection and Ranging, is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth. These light pulses combined with other data generate precise, three-dimensional information about the shape of the Earth and its surface characteristics. Two types of LIDAR are topographic and bathymetric. Topographic LIDAR typically uses a near-infrared laser to map the land, while bathymetric lidar uses water-penetrating green light to also measure seafloor and riverbed elevations.

LIDAR systems allow scientists and mapping professionals to examine both natural and manmade environments with accuracy, precision, and flexibility. NOAA scientists are currently using LIDAR to produce more accurate shoreline maps, make digital elevation models for use in geographic information systems, to assist in emergency response operations, and in many other applications. Existing data sets could be utilized to develop a multi-layered geographic information system (GIS) to improve the understanding of South Carolina river systems and make better-informed management decisions.

Based on recent flooding events, special study should be given to the north east region of the state around Marlboro and Marion counties along the Pee Dee River system. The combined effects of increased water flow from North Carolina and saturated land in South Carolina along this river system create ideal conditions for flooding. Consideration should be given to improving water storage in this area. A regional basin or reservoirs that collect and store the excess water could be constructed and utilized and designed so that a lake or pond is created. The lake may provide recreational benefits, water supply, and/or hydroelectricity. Additionally, creation of a man-made lake in this area of the state could not only help alleviate a recurring

risk of flooding but provide the potential for a huge economic windfall for the area's residents and future investors and business owners/operators.

There are federally funded programs that may be of assistance. FEMA is encouraging communities to incorporate methods into eligible Hazard Mitigation Assistance (HMA) funded risk reduction activities by providing guidance on mitigating flood and drought conditions. FEMA has developed initial guidance on flood and drought mitigation activities including green infrastructure methods, expanded ecosystem service benefits, and three flood reduction and drought mitigation activities: Aquifer Storage and Recovery (ASR), Floodplain and Stream Restoration (FSR), and Flood Diversion and Storage (FDS).

The Flood Diversion and Storage (FDS) projects involve diverting floodwaters from a stream, river, or other body of water into a wetland, floodplain, canal, pipe, or other conduit (e.g., tunnels, wells) and storing them in above-ground reservoirs, floodplains, wetlands, green infrastructure elements, or other storage facilities. Many FDS projects are currently eligible for HMA funding as flood risk reduction activities.

OBJECTIVES

To develop a statewide multi-layered geographic information system (GIS) to improve the understanding of South Carolina river systems using LIDAR and other current available data sets.

To review the current status of South Carolina's dams and make recommendations.

To review the feasibility of a water diversion plan along the Pee Dee river system to include creation of a lake or reservoir and create a detailed plan to construct and implement.

To review the possibility of Federal Funds for the diversion program through FEMA's Flood Diversion and Storage Program.

DELIVERABLES

- Completion of a multi-layered geographic information system (GIS) about the state's river and dam systems.
- A report on the current status of the state's dams with recommendations.
- A detailed planning report on diversion of waters from the Pee Dee river system.
- A report on the availability of federal funds for the Flood Diversion and Storage Program.
- Completed outreach plan for stakeholders in the affected flood diversion area.

TIME FRAME

1Q '19 Status report on River and Dam GIS report progress.

1Q '19 Feasibility report on Pee Dee diversion program.

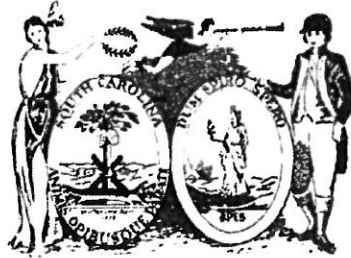
1Q '19 Feasibility report on availability of Federal Funds for diversion program.

1Q '19 Identification of stakeholders in proposed area affected by flood diversion.

2Q '19 Detailed plan draft of proposed flood diversion program.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

CO-CHAIRMEN GRID SECURITY TASK FORCE

SENATOR THOMAS C. ALEXANDER

Chairman, State Regulation of Public Utilities Review Committee

Senator Thomas C. Alexander was elected to the South Carolina Senate on October 11, 1994, in a special election. Alexander serves on the Senate Finance (Health and Human Services Subcommittee Chairman); Labor, Commerce and Industry; Banking and Insurance; General (Chairman); Invitations; Joint Bond Review; Fish, Game and Forestry; and the Public Utility Review Committees.

While serving in the South Carolina House of Representatives he chaired the Labor, Commerce and Industry Committee, one of only six major standing committees of the House.

Senator Alexander is the first South Carolina Legislator to serve as Chairman of the SC House of Representatives – Labor, Commerce and Industry Committee and Chairman of the SC Senate – Labor, Commerce and Industry Committee.

A native South Carolinian, who resides in the Town of Walhalla in Oconee County with his wife, Lynda. Alexander is a businessman and owner of Alexander's Office Supply stores and Cleveland Gospel Supply.

He is a member and past president of Walhalla Sertoma Club and Walhalla Lions Club and was named the Walhalla Lion of the Year in 1984-85.

Alexander is active in the Walhalla Presbyterian Church where he is a Sunday School teacher. He has served as Deacon, Elder, and as Clerk of Session.

He holds an associate's degree from Anderson College and a bachelor's degree from Clemson University.

He currently serves on the Board of Appalachian Council of Governments, as well as the Board of Directors of the Blue Ridge Bank in Walhalla. He has previously served on the Anderson College Alumni Board, The Tribble Center Foundation Board, as Chair of the District Friends of Scouting Campaign for 2001, Foothills YMCA Board, Board of Easter Seals (Anderson-Oconee), and he has been recognized by various organizations over his legislative career.

KELLER KISSAM

President, SCE&G

Keller Kissam was born and raised in the farming community of Creston, South Carolina (population 33). He graduated summa cum laude with a Bachelor of Arts Degree from The Citadel, The Military College of South Carolina, in 1988, where he served as the Regimental Commander of the South Carolina Corps of Cadets and received the Order of the Palmetto, as well as an Honorary Doctorate of Business.

Upon graduation in 1988, Kissam began his career with SCANA in the New Utility Professional Program. He spent a year working in various departments of SCANA. After completing this program, he worked for South Carolina Pipeline Corporation supporting industrial customers served by the pipeline. Kissam was promoted to manager of contract administration, and in 1993, became vice president of SCPC and was responsible for contract administration and gas supply.

In 1996, he moved over to work for SCE&G as vice president of gas operations and was responsible for the gas distribution operating company in South Carolina until 2003, when he became vice president of SCE&G electric operations - a position he held until he was promoted to his current position.

Kissam is also active in the community. He serves as President of the Independent School Association of South Carolina and is on the boards of the Southeastern Electric Exchange, Wilson Hall School, and The Citadel Brigadier Foundation. He also represents SCANA on the Midlands Business Leadership Group and the Central South Carolina Alliance. He also has been teaching Sunday school at Shandon United Methodist Church for more than two decades. Kissam formerly served on the boards of The Children's Hospital, Senior Resources, City Year, Midlands Technical College Foundation, and Hammond School. He is married and has two children.

BABS WARNER

VP, Legal Services and Corporate Secretary, Santee Cooper

Warner oversees legal services, land rights acquisition and the office of the corporate secretary. Previously, she served as associate general counsel over litigation and environmental affairs for 11 years at Santee Cooper. Prior to Santee Cooper, she served at Buist, Moore, Smythe & McGee as a trial and environmental attorney. She is a member of the South Carolina Bar Board of Governors, Chair of the Board of Directors of the Coastal Community Foundation and Vice Chair of the Trident United Way Women's Leadership Council. Warner graduated from USC in 1986 with a BS in political science and earned her law degree from USC in 1989. She is married and lives in Moncks Corner.

JAMES CLARK

President, SC State University

Longtime South Carolina business leader and active member of SC Aerospace's Education Work Group James Clark was named South Carolina State University's 12th president, effective July 1, 2016.

James is an active member of the Experimental Aircraft Association and an aviation enthusiast. He is a private pilot who has built several aircraft and is a tireless advocate for aerospace education.

He was named to S.C. State's Board of Trustees but resigned prior to being named president. He was also a Benedict College trustee for 18 years.

A Columbia resident, James is a graduate of M.I.T.'s Sloan School of Management. He previously worked for General Electric, Gillette, Exxon International and, most recently, AT&T, where he is credited with turning around the company's once-struggling computer business division.

J.R. SANDERSON

Jeffrey R (JR) Sanderson serves as the Program Director for the South Carolina Disaster Recovery Office. In this role, he is responsible for the execution of complex federal Disaster Recovery funding to recover homes affected by the 2015 Severe Flood and from Hurricane Matthew in 2016. The program is repairing/replacing over 2300 homes of South Carolina's most vulnerable citizens over the course of the next three years. Prior to this position, he served as Chief of Staff for the South Carolina Department of Motor Vehicles where he was responsible for all Operations, Information Technology, Training, and all field offices across the state.

Mr. Sanderson is a military retiree having served for over 31 years in the United States Army. He began his career as a Private and retired as a Colonel. During his career he commanded both an Infantry Company and a Battalion/Task Force in sustained combat operations. His last two assignments included command of the historic 4th Cavalry Brigade from 2006 until 2008, and Chief of Staff of the Army Training Center at Fort Jackson from 2008-2011. His military awards and decorations include the Presidential Unit Citation, Valorous Unit Award, the Silver Star, 2 awards of the Bronze Star, and 2 awards of the Legion of Merit.

He earned a Bachelor's degree in Criminal Justice from Western Carolina University in 1984, a Masters of Public Administration from Western Kentucky University in 1995, a Masters of Military Arts and Science from the School of Advanced Military Studies in 1997, and a Masters of Strategic Studies from the Air War College in 2006. He also serves as a Graduate Adjunct Professor of Leadership and Management at Webster University. His hobbies include Bluegrass banjo and studying history.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

GRID SECURITY TASK FORCE

BACKGROUND

A. Risk of Flooding to Grid Security

Grid security is an important sector requiring measures to safeguard during a flooding event. A key element of resiliency and recovery during a flooding event is the safety, security, and continued operation of the electric grid for the State of South Carolina. Not only is it important to maintain critical infrastructure assets, it is also imperative for the reassurance of South Carolinians to provide sanitary essentials, continued recovery, and continuity of normal activities.

If South Carolina experiences weather conditions similar to the 2015 flooding event, there could be a potential impact to the grid. The main impacts in 2015 were due to torrential run-off of surface water washing away soil bases around wooden utility distribution poles, and additional structural damages to homes and businesses that prevented power from being restored. The most vulnerable locations were the utility infrastructure assets located on, adjacent, or downstream from compromised dams. Both distribution and transmission electrical structures, as well as natural gas piping, were impacted as result of erosion resulting in catastrophic dam failure.

The most destructive element that was not part of the 2015 flooding to the electric grid was wind. During Hurricanes Matthew, Irma, Florence, and Michael, the element of wind coupled with drenching rains provided a much greater threat to grid security. The various system control centers for transmission; dispatch operations for distribution; and the control rooms for each power generating plant must be secure and equipped with secondary power sources in order to continually provide operation and monitoring of the various electrical systems.

B. Overview of the Electric Grid Functionality

The electric grid is comprised of three basic elements – generation, transmission, and distribution.

1. Generation – South Carolina is blessed with very reliable generation assets fueled by nuclear, coal, and natural gas. South Carolina is also blessed with wonderful rivers and lakes that provide hydro-generated energy as well.

2. Transmission – Electrical transmission structures are either wood, concrete, or steel. Flooding has very little impact on these facilities. Transmission wood is typically able to handle 50 – 75 mph winds with little impact with the exception of large trees falling from outside existing rights-of-way. Such up-rooting can occur within wind speeds of 30 – 50 mph given ground saturation levels. Concrete structures can typically bear wind load above 100 mph, but the weight of concrete makes construction difficult due to the sheer weight of a solid concrete structure. Steel transmission is the most improved material for transmission. Light, flexible, and sturdy steel structures, whether direct imbedded or bolted to foundations provide wind loading up to 150 mph. Their slip-jointed construction also avoids the weight of concrete poles as well. As long as these structures are not located in vulnerable areas such as dams and high velocity water run areas, they do not represent a significant risk to the grid regarding a flood. A flood with high winds, however, presents vulnerabilities. Finally, there are very limited underground electrical transmission facilities that would be subject to the same risks as natural gas pipelines.

3. Distribution – In South Carolina, approximately 80% of electrical distribution lines are above-ground, with approximately 20% underground. Underground is typically placed into service in high-density neighborhoods and typically represents a non-standard service. Impacts from flooding to overhead distribution is minimal unless facilities are in vulnerable areas such as weak dams or high-water flow areas resulting in severe erosion. Flooding, coupled with wind, can begin impacting distribution when wind speeds reach up to 35 – 40 mph.

OBJECTIVES

1. Research and identify the critical infrastructure assets; existing power plants and major electrical substations that have been inundated by storm surges and/or flooding in previous natural disasters effecting SC. If needed, identify a plan of action for the construction to retrofit and/or remove existing power plants and electrical substations located on, adjacent, or downstream from compromised dams to increase the resiliency to flooding.
2. Research and develop a plan to implement for effective mobilization and logistics of utility crews to impacted flood areas.
3. Identify the electrical distribution infrastructure that are in high risk areas affected during previous flooding events in SC.

DELIVERABLES

- 1. Research and identify the critical infrastructure assets; existing power plants and major electrical substations that have been inundated by storm surges and/or flooding in previous natural disasters effecting SC. If needed, identify a plan of action for the construction to retrofit and/or remove existing power plants and electrical substations located on, adjacent, or downstream from compromised dams to increase the resiliency to flooding.**

The critical infrastructure assets that are deemed priority will be located in areas near the major river systems across SC. Once those target areas are identified, organize a roundtable discussion with all existing electric utility providers in the target areas deemed critical to discuss and implement a future plan of action in an event of flooding.

The electric grid generation target areas to include are:

Nuclear – During a flood and wind event, nuclear plants must reduce power and disconnect from the grid when wind speeds are predicted to reach 75 mph. This was certainly the case in North Carolina when Hurricane Florence impacted the Brunswick area. South Carolina's nuclear units are all located away from coastal areas, but it is possible wind speeds could potentially impact locations in Hartsville, Fairfield, Oconee, and York counties. These units, however, are highly regulated from a plant safety, public safety, and reliability perspective, and such events are simulated on a regular basis.

Coal – Although not as scrutinized as much as nuclear, coal-fired power plants share similar wind restrictions but more from a practical standpoint. All coal-fired structures generate steam for power production, and therefore have open-air or enclosed boilers. Wind loading conditions can result in personnel being grounded and unable to perform maintenance on these multi-storied (average seven to ten stories), tubed hot boxes. As a result, these generating facilities can be rendered inoperable during such conditions due to the fact that access is via suspended girders and walkways.

Another impact of coal-fired facilities due to flooding is the inability to receive deliveries of coal for fuel. A major impact of Hurricane Florence, as well as the Flood of 2015, was the wash-out of certain railroad trestles that prevented trains to deliver coal to various power plants. In fact, even though Hurricane Florence caused less damage to railroads in South Carolina than the flood of 2015, normal train traffic was unable to resume until all tracks could be traversed and confirmed to be safe. This process took up to two weeks. During this time, coal trains needed to re-supply coal-fired plants were stranded at various depots from the mines of West Virginia and Kentucky down to side tracks throughout South Carolina.

The most critical risk for coal-fired facilities during a flood event is the potential impact to ash-ponds near navigable water-ways. Just like cinders in a fire place, ash is a combustible by-product of coal and is stored on-site at coal generating facilities. Although utilities in SC, for the

most part, have initiated volunteer clean-up of such sites by way of beneficial recycling with concrete manufacturers or moving ash into more hardened, lined ponds, legacy issues remain. Thorough inspection of existing dams for ponds and complete evaluation of the “board-feet” of difference between historical river elevations in comparison to dam heights is a critical means of establishing proper preparation for such events. In fact, in 2018, during Hurricane Florence, the South Carolina Public Service Authority utilized deployment of Aqua Dam. Aqua Dam is a water-filled, rubberized bladder system that is deployed upon dams vulnerable to over-topping by floodwaters. Santee Cooper was able to add approximately thirty-seven inches in height and six feet in width to its Grainger Generating Plant ash-pond dam in Conway, SC and successfully prevented the Waccamaw River from over-whelming to the ash pond. It should be noted that Grainger has been retired from service, yet its ash ponds (2) remain.

Natural Gas – Natural Gas generating facilities can be impacted by high wind conditions just as coal-fired plants. The more imminent threat to natural gas generating facilities occurs when weather impacts the Gulf of Mexico affecting off-shore natural gas and oil rigs. Curtailment of supply typically follows the abandonment of such rigs resulting in an inability to obtain adequate fuel supply. A secondary risk to natural gas generating facilities due to flooding is having both interstate and intrastate pipelines that serve generating facilities to be exposed to hydraulic pressure or breach as a result of erosion or flood waters.

Hydro – Hydro generating facilities utilize flowing water from a river or a reservoir to turn a turbine and generate electricity. One would assume that a hydro facility would do well to have an over-abundance of water. This is certainly not the case given that these facilities must prepare for such a deluge by making room in a reservoir to receive such an influx of water. In addition, it must be mindful of downstream flows that could impact areas. Also, these hydro facilities are equipped with emergency floodgates to allow for a release in order to protect the reservoir under federal licensing guidelines. A final challenge in South Carolina is that different utilities are interconnected by common watersheds. Thus, coordination of generating facilities within these watersheds is absolutely necessary.

2. Research and develop a plan to implement for efficient and effective mobilization of state utility crews during future areas impacted by flooding; including:

- (1) The bridges and roads that potentially could be affected by the flooding and will not be accessible route;
- (2) Material delivery methods to the effected sites; and
- (3) Track equipment to ferry resources and material.

3. Identify the electrical distribution infrastructure that are in high risk areas affected during previous flooding events in SC.

- (1) Underground distribution can actually be subject to more damage during a flood. Switch cabinets and transformers flood causing operation failure and outages; and

(2) In the coastal areas of South Carolina, high tides coupled with severe flooding can result in salt water intrusion rendering electrical distribution useless. During Hurricane Matthew, numerous underground facilities subjected to salt intrusion were temporarily replaced with overhead facilities in order to restore power to customers.

IV. TIMELINE

Objective 1

- (1) Research and identify the critical infrastructure assets; existing power plants and major electrical substations that have been inundated by storm surges and/or flooding in previous natural disasters effecting SC.
- (2) If needed, identify a plan of action for the construction to retrofit and/or removal of the existing power plants and electrical substations located on, adjacent, or downstream from compromised dams to increase the resiliency to flooding.

Objective 2

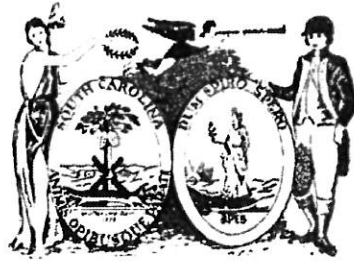
Research and develop a plan to implement for the efficient and effective mobilization of the state utility crews during future areas impacted by flooding.

Objective 3

- (1) Identify the electrical distribution infrastructure that are in high risk areas affected during previous flooding events in SC.
- (2) Develop a path forward to update the infrastructure based on high to low priority.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

CO-CHAIRMEN

LANDSCAPE BEAUTIFICATION & PROTECTION TASK FORCE

HUGH WEATHERS

Commissioner, South Carolina Department of Agriculture

Hugh E. Weathers has been serving as South Carolina's Commissioner of Agriculture since September 2004. Under Commissioner Weathers' leadership, the Department has created the Certified SC Grown branding program to help consumers easily identify and purchase South Carolina products, while increasing market opportunities for farmers across the state. In 2009, Commissioner Weathers introduced the 50 by 20 goal to grow the economic impact of South Carolina agribusiness (agriculture and forestry) from \$34 billion to \$50 billion by the year 2020. From the time of the plan's introduction to 2013, the economic impact of agriculture, alone, increased from \$16.9 billion to nearly \$18 billion. In addition, Commissioner Weathers led the relocation of the State Farmers Market to Lexington County. This new facility, in West Columbia, is a great venue for helping citizens connect with agriculture. The campus includes a new multi-purpose auditorium and the T. Ashton Phillips Conference Center, as well as a Consumer Protection laboratory facility.

Commissioner Weathers was born in Bowman, South Carolina and is a fourth-generation farmer. He graduated magna cum laude from the University of South Carolina in 1978, earning BS Degrees in Accounting and Finance. He was inducted into Phi Beta Kappa in 1977. Upon graduation, he was employed as a Corporate Banking Officer with C&S National Bank before returning to Weathers Farm. He is a partner in the family's 80-year old dairy business and row crop farm. He and his brother, Landy, also operate a bulk milk delivery business for thirty other South Carolina farmers.

The Commissioner serves on numerous local, state, and national agricultural, business, economic development, and banking committees and boards. In 2011, he was inducted into the South Carolina Dairy Hall of Fame and has received numerous other awards and

recognitions both prior to assuming office in 2004 and as an elected statewide constitutional officer.

He is married to the former Blanche Gramling of Spartanburg County, who grew up on her family's peach farm. They have three sons: Gill and his wife Elizabeth, Edward and his wife Anna, and Julius, as well as 2 granddaughters. The Weathers are members of Orangeburg First Baptist Church.

Commissioner Weathers considers it a privilege to serve the citizens of South Carolina and to lead our state's largest industry — agribusiness.

To contact Commissioner Weathers' office, click to the Office of Commissioner.

DUANE PARRISH

Director, South Carolina Department of Parks, Recreation, & Tourism

Duane Parrish is the Director for the South Carolina Department of Parks, Recreation & Tourism (SCPRT). Parrish has dedicated over 35 years of his professional career to the hospitality industry, including extensive experience in hotel property management and development throughout South Carolina. He was appointed to his current cabinet position by Governor Nikki R. Haley in January 2011.

Prior to his appointment as Director of SCPRT, Parrish served as President of the Premier Hospitality Group and was responsible for all daily operations, with oversight of various other divisions including development, human resources, accounting, and real estate sales. Utilizing a hands-on approach to business, Parrish has led many properties under PHG management to receive special recognition for improvements in guest relations and overall performance. Parrish has also held several senior management positions within the hotel industry at distinguished organizations including Promus Hotels (now Hilton Hotels), Holiday Inns, and Ramada Inns. Parrish has opened, operated, or renovated 19 hotels ranging from a 32-room independent inn to a 260-room full-service hotel. His hospitality experience also includes management of the Charleston Area Convention & Visitors Bureau.

A graduate of the University of South Carolina in Business Administration, Parrish has served as an adjunct professor at the College of Charleston and Trident Technical College teaching hotel management and hospitality courses. He has also been an active member of the South Carolina Hospitality Association, and once served as Chairman. Parrish has also served on a number of other boards for the Chamber of Commerce, the Convention and Visitors Bureau, various hotel associations, and two college advisory boards.

SEN. TOM DAVIS

South Carolina Senator

Tom Davis and his wife, Reid, reside in Beaufort, South Carolina, with their three daughters, Elizabeth (student at Clemson University), Grace and Claire.

Sen. Davis obtained a Bachelor of Arts degree from Furman University in 1982, graduating magna cum laude and as a member of Phi Beta Kappa, and a Juris Doctor degree from the University of Maryland School of Law in 1985, graduating with highest honors and as a member of the Order of the Coif.

He has practiced law in Beaufort at the law firm of Harvey & Battey, P.A., since 1985.

He has served as a board member of the Beaufort County Planning Board, Lowcountry Council of Governments, Historic Beaufort Foundation, the Beaufort-Jasper Water & Sewer Authority and the South Carolina States Ports Authority.

As a member of the Jasper Ocean Terminal Joint Project Office, Sen. Davis led the State of South Carolina's successful negotiations with the State of Georgia in regard to the two states developing collaboratively a new port on the Savannah River in Jasper County.

From 2003 to 2008, Sen. Davis served in the office of the Governor of the State of South Carolina as a senior policy advisor, deputy chief of staff and chief of staff.

On November 4, 2008, Mr. Davis was elected State Senator for South Carolina Senate District 46 (portions of Beaufort and Jasper Counties).

REP. LEONARD STAVRINAKIS

South Carolina Representative

Leon was born in Charleston, attended Orange Grove Elementary School and graduated from Middleton High School. He earned his bachelor's degree from the College of Charleston and graduated from the University of South Carolina School of Law.

He has served in the General Assembly since 2007. Prior to that, he served as Chairman of Charleston County Council and as a local prosecutor.

First elected to the legislature with the support of Republicans, Democrats and Independents, Leon has earned a reputation as being a bipartisan problem-solver, and a fiscally-responsible leader. He has repeatedly voted against tax hikes – demanding efficiency and eliminating waste. He repeatedly cut income, property and sales taxes, while still making critical investments in our roads, neighborhoods and schools.

Leon and his wife Anne live in West Ashley. They have three children, Clara Anne, Emmanuel and Emma.

He has been voted Legislator of the Year by the Charleston Metro Chamber of Commerce and the Port of Charleston's Maritime Association of South Carolina, while also maintaining a 95% lifetime pro-environment voting record and receiving repeated endorsements by the Conservation Voters of South Carolina.

Elected Chairman of the Charleston County Council by a bi-partisan group of his colleagues, Leon oversaw the budget that elevated Charleston County's credit rating to AAA. He helped pass the state's first county-wide smart growth management plan, the urban growth boundary, and the state's first county green space preservation plan.

Leon's experience includes helping to secure the funding for I-526 and the Ravenel Bridge.

WILLIAM BRUNO

Bill Bruno lives in Rock Hill where he proudly raised all three of his sons, two now in the military and one working towards a career in law enforcement. He has been a design engineer for semiconductor metrology products for over twenty years. He has been a middle school teacher and has maintained a SC General Contractors license and has inspected, rehabilitated and remodeled dozens of homes over the past twenty years in both Carolinas. For the past seven years he has served in the SC State Guard and currently serves as the Secretary to the General

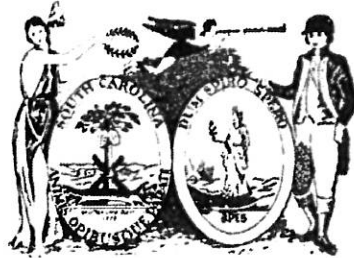
Staff where he assists the command staff with data collection and dissemination, report writing, and any other tasks for the commanders and Chief of staff.

Bill currently lives part time on a sailboat on the largest man-made body of fresh water in North Carolina, Lake Norman, where is studying the engineering history, environmental impact and public impact that that project has had on the Catawba River basin and surrounding Piedmont region.

- Associates of Electrical Engineering from the State University of New York (SUNY) Utica NY
- Bachelor of Science in Education with concentrations of General Science and English from Winthrop University in Rock Hill SC.
- Licensed South Carolina General Contractor since 1999.
- South Carolina Notary Public
- Secretary to the General Staff and Captain in the South Carolina State Guard with seven years of service.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

LANDSCAPE BEAUTIFICATION & PROTECTION TASK FORCE

BACKGROUND

One of the most important elements in successful green space is beautifying public places. Beautification and protection mechanisms are exciting reasons to use plants in new ways to improve the lives of those within vicinity. These green oases give pleasure to millions who crave a connection with nature in their lives.

Beautification and protection mechanisms are established to enhance the natural beauty of areas by adding creative landscape designs and flowers throughout. Design, installation, and maintenance of all permanent landscaping around properties and public right of ways, allow for the ability to take a raw property and transform it into a beautiful and efficient landscape.

Urbanization, clearing trees, draining wetlands, and paving the ground exacerbates flooding. **This task force will examine ways to reduce urban flooding using green space areas and through the use of permeable surfaces wherever possible in landscapes.** Driveways, sidewalks, patios, parking lots, and pathways can be made from porous materials that are firm, but which still permit water to drain. Porous concrete, and porous asphalt are some of the materials that could be utilized to increase permeability.

Along the coast, the careful planning and planting of native coastal plants can help protect property from storm damage and flooding. Coastal dunes provide a buffer against coastal hazards such as wind erosion, wave overtopping and tidal inundation during storm events. They also provide a source of sand to replenish the beach during periods of erosion. For this reason, the protection of coastal vegetation is important for the long-term protection of beach front properties.

Coastal dunes have three general vegetation zones based on soil salinity that can vary in width or may even be entirely absent. These zones can intergrade, and sharp distinctions between

zones are usually absent. Landward of the highest tides, frontal zone sites are stabilized by sand trapping action of various rhizomatous grasses and low growing forbs that are tolerant of salt spray. Trough areas and additional inland dunes may fall in the frontal zone area. Landward of the frontal zone area, the “backdune” zone (also often called the shrub or scrub zone) supports less salt tolerant grasses and forbs as well as shrubs and some trees. The forest zone is the vegetation zone farthest from the ocean, and the vegetation in this zone transition from maritime to non-maritime species. Marshland or grassy areas may occur between the “backdune” and forest zone areas.

Frontal Zone: Only a few plant species can tolerate the stresses of a dune environment, particularly frontal dune sites. Foredune plants must be able to survive being buried by blowing sand, sand blasting, salt spray, salt water flooding, drought, heat, and low nutrient supply. Salt spray, by providing potassium, sodium, calcium, and magnesium, is a major source of plant nutrients in dune soils. In the absence of salt-bearing onshore winds, many coastal dune plants grow poorly or die. Many plant species that occur on dune areas have developed specific attributes to help them survive these harsh environments. These include high growth rates, dense root systems, low profiles, and high flower and seed production rates. In the south Atlantic, the fore-dune grasses are usually sea oats (*Uniola paniculata*), bitter panicum (*Panicum amarum*), and marshy cordgrass (*Spartina patens*). Forbs such as sea rocket (*Cakile spp.*), sea purslane (*Sesuvium portulacastrum*), and morning glory (*Ipomoea spp.*) are found on frontal dune sites.

Backdune and Forest Zone: The backdune zone, a series of older dunes that are more stable and have higher organic matter, occur landward of the foredune area. When sufficient organic matter accumulates in dune fields on the mainland or barrier islands, colonizing woody vegetation becomes established. Many of the woody species found in dune fields are low growing and shrubby due to low nutrient and drought conditions. Wind and salt spray can have a dramatic effect on the growth and appearance of vegetation adjacent to the ocean. High winds and salt spray often prune the terminal buds of the trees and shrubs growing on the dunes and result in salt-saturated, windswept canopies.

Salt exposure is just one of the many environmental factors that makes coastal landscaping challenging. Selecting plants that are tolerant to salt exposure will increase the rate of success. Salt tolerant plants can range from highly to moderately tolerant.

High salt tolerance plants will grow where they are subject to direct salt spray received along sand dunes and adjacent to the oceanfront. These plants are highly resistant to salt drift and can be used in exposed environments. Plants with a moderate salt tolerance will grow adjacent to the beachfront, but are sheltered by higher salt tolerant plants, structures, or sand dunes. They will tolerate some salt spray but will grow best where they are protected from direct contact.

Fertilization - Initial fertilization is best done at planting with a complete, controlled-release fertilizer.

Irrigation - Irrigation is advisable, where practical, on all dune plantings to ensure adequate moisture during the initial establishment period. Excessive irrigation can favor weedy species to the detriment of dune vegetation, so irrigation should not be used after stands are established.

Maintenance - Native dune species should require little maintenance after establishment. Sites should be monitored for establishment of invasive species and weeded as necessary. All sites should be protected as much as possible from foot and vehicular traffic.

OBJECTIVES

- Appeal unsightly features.
- Contribution to improvement of landscape grounds.
- Reservation for beautification areas provide protection to property.
- Productive use of property - property used for its "highest and best" use maximizes the value of that property.
- Planting native coastal plants will protect property from storm damage and flooding (impact absorption and buffering system).
- Utilization of porous materials that are firm, but that still permit water to drain.
- Maintain attractive places that can stimulate new economic opportunities.
- Coordinate activities with "Living Shoreline Task Force" along coastal areas.

DELIVERABLES

- Landscape consultation to analyze most reasonable outcome.
- Engage in designing and planning the changes necessary to achieve desired results.
- Inspire design ideas and learn techniques for adding interesting elements.
- Grounds to be designed, planted and attended from inception.
- Examine ways to reduce urban flooding using green space areas.
- Examine ways to reduce urban flooding through the use of permeable surfaces wherever possible in landscapes.
- Community involvement and association in planting and beautification development.

TIME FRAME

1Q '19 Identification and recruitment of community volunteers to participate in planning and beautification design.

1Q '19 Research and identification of plants that will support flood mitigation programs.

2Q '19 Development of design and inception planning for landscape.

2Q '19 Generate inception of permeable surface construction.

2Q '19 State-wide maintenance of beautification and protection.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

CO-CHAIRMEN NATIONAL SECURITY TASK FORCE

LT. GEN. MICHAEL X. GARRETT

Commander, United States Army Central (USARCENT)

Lt. Gen. Michael X. Garrett is the Commanding General of U.S. Army Central located at Shaw Air Force Base, South Carolina. A native of Cleveland, Ohio, he received his commission in 1984 as a Second Lieutenant in the Infantry upon graduating from Xavier University.

Garrett's assignments include Chief of Staff of U.S. Central Command, Commanding General of United States Army Alaska and multiple joint and operational tours, staff assignments at numerous levels as well as several commands. Highlights include commanding 3rd Battalion 325th Infantry (Airborne), 82nd Airborne Division at Fort Bragg North Carolina. He deployed to Afghanistan as chief of current operations, Combined Task Force 180 in support of Operation Enduring Freedom. He then commanded 4th Brigade Combat Team (Airborne), 25th Infantry Division (Light) which deployed in support of Operation Iraqi Freedom. Following Brigade Command, Lt. Gen. Garrett served as the Deputy Commanding General of United States Army Recruiting Command. Following his tour with Recruiting Command, Lt. Gen. Garrett returned to Fort Bragg where he served as the Chief of Staff, XVIII Airborne Corps. As the XVIII Airborne Corps Chief of Staff, he deployed to Iraq in support of Operation New Dawn where he served as the Deputy Chief of Staff for United States Forces-Iraq.

Lt. Gen. Garrett's military education includes completion of the Infantry Officer Basic and Advance courses, the US Army Command and General Staff College and a prestigious Senior Service College Fellowship. He also holds a Bachelor's Degree in Criminal Justice from Xavier University.

BRYAN HILFERTY

United States Army Central (USARCENT)

A Boston native, Hilferty retired from U.S. Army Central at Shaw in August. He had served as its director of communications, and previously served as director of communications for the U.S.

Military Academy at West Point, the U.S. Army Human Resources Command at the Pentagon and U.S. Army Europe.

As the Strategic Planner for U.S. Army Central, he advises the commanding general on strategy and policy. Assist with his writing, research, analysis and engagements. Lead the Commander's Communications Strategy process. Write commander's speeches, remarks, presentations, and assessments. Provide strategic input and analysis including writing strategic white papers. Edit senior staff papers and mentor writers. Design, organize and lead the commander's semi-annual historical staff ride.

BRIGADIER GENERAL JAMES GLYNN

Commander - Parris Island

Brigadier General Glynn joined Marine Corps Recruit Depot Parris Island and Eastern Recruiting Region after serving as the Deputy Commanding General of Special Operations Joint Task Force, Operation Inherent Resolve (Forward) since July 2017. Previously, he served at Headquarters Marine Corps (HQMC)—first as the Military Assistant to the Assistant Commandant of the Marine Corps and then as the Director of the Office of U.S. Marine Corps Communication. A native of Albany, New York, his service as a Marine began in 1989 after graduating from the U.S. Naval Academy with a Bachelor of Science Degree in Mechanical Engineering. His initial assignment was with 3rd Battalion, 3rd Marine Regiment, in Hawaii where he served as a rifle platoon commander throughout Operations Desert Shield/Desert Storm and later as the 81 mm Mortar Platoon Commander. He has served in a variety of command and staff billets at: Marine Barracks 8th & I, Washington, DC; 1st Battalion, 4th Marine Regiment, Camp Pendleton, California; Marine Corps Recruiting Station, San Antonio, Texas; I Marine Expeditionary Force, and Marine Corps Forces Special Operations Command's (MARSOC) Special Operations School, Camp Lejeune, NC. In addition to his most recent deployment, Brigadier General Glynn deployed with four Marine Expeditionary Units (Special Operations Capable) and, while assigned to the G-3, Future Operations, 1st Marine Expeditionary Force, he served in Fallujah, Iraq in support of Operation Iraqi Freedom II. He later returned to Iraq in 2006-2007 as the Battalion Landing Team Commanding Officer, 2nd Battalion, 4th Marine Regiment, 15th Marine Expeditionary Unit (Special Operations Capable). He is a joint qualified officer following three years with the Theater Special Operations Command - Africa, in Stuttgart, Germany and recent deployment with Special Operations Joint Task Force, Operation Inherent Resolve (Fwd), in Baghdad, Iraq.

Brigadier General Glynn is a graduate of Harvard Business School's Advanced Management Program and earned a Master of Science Degree in National Security Affairs from the U.S. Army War College, a Master of Science Degree in Military Studies from the Marine Corps Command and Staff College and is a graduate of the Marine Corps Amphibious Warfare School. His personal decorations include the Defense Superior Service Medal, Legion of Merit Medal with one gold star, Bronze Star Medal, Purple Heart Medal, Meritorious Service Medal with one gold star, Navy and Marine Corps Commendation Medal with one gold star, Navy and Marine Corps Achievement Medal with Combat Distinguishing Device and one gold star, and the Combat Action Ribbon with one gold star. He is married with two children.

MAJOR GENERAL ROBERT E. LIVINGSTON, JR.

South Carolina Adjutant General

Major General Robert E. Livingston, Jr. serves as the head of the Military Department of the state of South Carolina. He administers the affairs of the South Carolina Army and Air National Guard, the Emergency Management Division, the State Guard, and the Youth Challenge Academy. The Governor, by law, is the Commander-in-Chief. The Adjutant General is a Constitutional Officer and has the rank of Major General (MG).

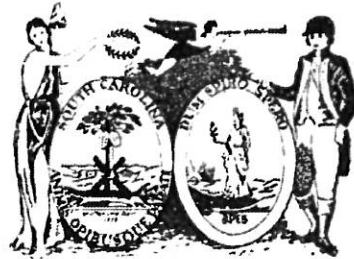
MG Livingston's military service began when he enlisted in the South Carolina Army National Guard in March 1978. His military education started with his completion of the U.S. Army Infantry School in 1978, followed by Airborne School in 1979. He was commissioned through the Palmetto Military Academy, Officer Candidate School in 1980 as the Distinguished Honor Graduate. MG Livingston commanded Task Force 218 in support of Operation Noble Eagle from June 2004 to January 2005. From May 2007 to April 2008, he commanded Combined Joint Task Force Phoenix (VI) in Afghanistan where he was responsible for the training, mentoring, and advising of the Afghan National Security Forces. His next assignment was Director for Strategic Plans and Policy (J5), National Guard Bureau, Arlington, Virginia. His last assignment was as Director, J5 Coalition Coordination Center, United States Central Command, MacDill Air Force Base, Florida where he was responsible for facilitating the exchange between the Command Staff for the United States Central Command and Military Senior National Representatives from over 60 countries. He was also charged with providing deployment support for Coalition Countries within the United States Central Command Area of Responsibility. Since January 2011, MG Livingston has served as The Adjutant General of South Carolina and serves as the last elected Adjutant General for the state of South Carolina.

In 2009, MG Livingston was presented the Sergeant William Jasper Freedom Award for his leadership and in December of 2016, he was presented the Order of the Palmetto, the highest civilian honor in the state. MG Livingston is married to Barbara Flora Livingston and they have four children, and five grandchildren.

Livingston is President, Chief Executive Officer, and Owner of Gregory Electric Company, Incorporated, headquartered in Columbia, South Carolina. Gregory Electric Company is a provider of complete commercial and industrial electrical, utility and telecommunications services with operations in nine states.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

NATIONAL SECURITY TASK FORCE

BACKGROUND

The South Carolina military community collectively creates an economic impact to the state of \$24.1 billion. South Carolina is home to eight major military installations and numerous facilities, supporting 62,520 in Department of Defense (DoD) personnel with \$2.6 billion in payroll. \$2.1 billion in DoD contracts is currently being executed among 752 firms within the state.

In recent years, extreme weather events have impacted numerous Department of Defense (DoD) installations, causing power outages and damage due to flooding, high winds and storm surges. The most substantial damage has occurred in areas where, for mission reasons, facilities are located within the areas designated by the Federal Emergency Management Agency (FEMA) as those within the 1% annual chance of flood boundary.

Executive Order, E.O.13653, issued in November 2013, requires each Federal agency to evaluate its climate change risks and vulnerabilities so as to manage the short and long-term effects on its missions and operations. The John S. McCain National Defense Authorization Act (NDAA) 2019 requires that all military installations include energy and climate resiliency efforts in their master plans to ensure the anticipation of, the preparation for, and the adaptation to utility disruptions. Storms and tidal flooding are disruptive and devastating. The loss of power can have consequences for maintaining mission-critical operations. The NDAA FY 19 requires the disclosure of flood risk of new construction and prohibits new military projects from being developed in the riskiest floodplain areas.

It is critical to our security and future economic prosperity that South Carolina take proactive steps to ensure the security of these federal installations.

The shifting hazard of increased flooding amplifies risks for people, valuable assets, essential infrastructure, and important economic industries such as energy production and shipping. **This task force will be charged with identifying potential risks associated with flooding events and making recommendations to prepare for and minimize those risks.** Extreme weather events could make critical facilities unusable or necessitate costly or manpower-intensive workarounds that would be unacceptable to military operations. A flooding event also poses risk for human security, for example through impacts on migration, culture, territorial integrity, and national security.

To prepare for and respond to such risks, SC policy makers across all levels of government, federal to local, need efficient, actionable evidence in support of critical decisions. Policy and operational perspectives are of importance, including coastal resource planners, government officials across scales and contexts, military and national security experts, and industry and private-sector leaders.

List of the Federal Installations in SC

- Marine Corps Air Station Beaufort
- Marine Corps Recruit Depot, Eastern Recruiting Region
- Coast Guard Sector Charleston
- Joint Base Charleston
- Fort Jackson
- McEntire Joint National Guard Base
- South Carolina National Guard
- Shaw Air Force Base

OBJECTIVES

1. Assessment of coastal erosion and potential flooding risks to federal installations in SC.
2. Integration of flood risk management into planning processes.
3. Develop and promote coastal resilience planning tools, making them readily available for policy and decision-makers.
4. Identify and propose incentives for communities from building or staying in harm's way through forward-looking zoning and land-use choices.

DELIVERABLES

- Develop a preliminary Screening Level Vulnerability Assessment to be used to determine the flood-risk. Conduct a level assessment to determine installation vulnerabilities to flood-related security risks with the goal of identifying serious vulnerabilities and developing necessary adaptation strategies. Establish action for the identified risk from the vulnerability assessment, the adaptation strategies developed for vulnerable installations, and the estimated costs associated with implementing these strategies.

Include close cooperation with federal military installations to mitigate potential risks to their critical infrastructure.

- Develop and promote coastal resilience planning tools, making them readily available for policy and decision-makers. The availability of a menu of recommended tools tailored for particular risks and geographic locations would allow communities to better identify their risks, assets, and vulnerabilities; evaluate existing and needed levels of protection; and assess the cost of their action or inaction. It would also allow for regional collaboration and communication and the sharing of failures as well as best practices.
- Identify and propose incentives for communities more forward-looking zoning and land-use choices. The communities in SC need support in incorporating the future risks of climate change as they conduct critical short and long-term risk assessments and engage in resilience and adaptation planning. To reduce future flood damages and promote public safety, communities need to make land-use and zoning decisions that account for future flood risk. Communities can promote resilient building through sharing co-benefits and responsibility with public and private stakeholders.

TIME FRAME

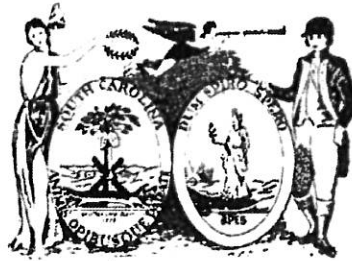
May 2019 - Assessment of coastal erosion and potential flooding risks to federal installations in SC

August 2019 - Develop and promote coastal resilience planning tools, making them readily available for policy and decision-makers.

March 2019 - Identify and propose incentives for communities to more safe, forward-looking zoning and land-use choices.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

CO-CHAIRMEN STAKEHOLDER ENGAGEMENT TASK FORCE

JOHN TECKLENBURG,

Mayor, Charleston South Carolina

Charleston Mayor John Tecklenburg spent much of his career as a businessman and entrepreneur—a family legacy that began with the opening of his great-great-grandfather's corner grocery store at St. Phillip and Wentworth streets in 1867. Mayor Tecklenburg founded Southern Oil Company in 1978, which he successfully owned and operated for nearly 20 years. Upon selling the business, he was appointed to serve as Director of Economic Development for the City of Charleston, where he helped lead the revitalization of Upper King Street. Mayor Tecklenburg holds a bachelor's degree in Chemistry from Georgetown University in Washington, DC and also attended the Berklee College of Music in Boston where he pursued his lifelong passion for music and jazz. Since becoming mayor in 2016, Mayor Tecklenburg has been committed to improving citizens' quality of life and making Charleston a city of opportunity for all.

Among his efforts to improve city-wide livability, Mayor Tecklenburg has paid particular attention to flooding and drainage relief, appointing the city's first-ever Director of Emergency Management and Resilience, and beginning the process of implementing the City of Charleston Sea Level Rise Strategy, which outlines actions designed to make the city more resilient to effects of increased disasters and changing weather.

Mayor Tecklenburg has also led initiatives to address housing affordability and homelessness in Charleston. These have including the closing of Tent City, a sprawling homeless encampment that had developed in our North Central neighborhood, and the formation of the Mayors' Council on Homelessness and Affordable Housing, which works to develop a long-term regional approach to these challenges.

In addition, he has championed Plan West Ashley, the largest, most comprehensive renewal and revitalization effort in our city's history. Modeled after the successful Downtown Revitalization Commission of the 1970s and '80s, the West Ashley Revitalization Commission is

working directly with citizens to create a master plan that will guide the area's development for years to come.

Mayor Tecklenburg and his wife Sandy are the proud parents of five grown children – Melissa, Suzanne, Paula, Joseph and John Henry. They reside in the Old Windermere section of West Ashley.

BRENDA BETHUNE

Mayor, Myrtle Beach, South Carolina

Mayor Brenda Bethune is a native of Myrtle Beach and serves as the CEO and majority owner of Better Brands, Inc. Mayor Bethune also owns BJ Investments, a property investment and rental company, and two bridal boutiques: The Little White Dress in Myrtle Beach and Maddison Row in Charleston, South Carolina. Mayor Bethune earned an Associate Degree in Business and has completed all required courses in the Anheuser-Busch Management Development Program. Brenda Bethune offers more than 35 years of business management experience. Mayor Brenda Bethune was the recipient of the Distinguished Citizens Award from the Pee Dee Council of Boy Scouts of America, the Special Operations Wounded Warriors' Tip of the Sword Award and Horry-Georgetown Early Care and Teacher Education's Champions for Children Award. Bethune was recognized with an award from the Palmetto Leadership Council in recognition of her contributions to South Carolina. Mayor Bethune previously served on the Board of Coastal Education Foundation, Coastal Carolina University's Spadoni College of Education Board, Coastal Carolina University's Visitors at Wall School of Business Board and the Coastal Carolina Bank Board. Bethune also was a founding board member and previous board president of the Children's Museum of South Carolina. She is a member of the SC Beer Association and the National Beer Wholesalers Association. Mayor Bethune is a member of Seacoast Vineyard Church in Myrtle Beach. Bethune's current term continues through January 2022.

JOHN MCCANN

Mayor, Hilton Head, South Carolina

John J. McCann started on Wall Street as a clerk, beginning a career in the financial industry that would send him around the world and to top executive positions. He retired in 2003 as Chairman and Chief Executive Officer of Bridge Trading, a Reuters Company. He has supervised thousands of employees and managed the construction of multiple facilities that included the headquarters of Lynch Jones and Ryan, in the country's second-largest private office building – 55 Water Street in New York.

McCann holds a Bachelor of Science degree from Thomas Edison State University in Trenton, N.J. He also served as an adjunct instructor for 11 years at the New York Institute of Finance, and was appointed a securities industry arbitrator & frequent expert witness for legal actions involving financial services firms.

McCann spent years as a volunteer baseball and basketball coach for underprivileged and handicapped children, and he helped create and teach innovative high school courses on fundamentals of the financial services industry. McCann is an avid baseball fan, traveler and beach walker. He and his wife, Valerie, have five grown children.

McCann has been a member of Hilton Head Island Town Council since November of 2012. One of his primary responsibilities was the Chairman of the Finance and Administrative Committee. McCann was elected Mayor in the Fall of 2018.

DAVID WIELICKI

South Carolina Waterfowl Association

David Wielicki founded the South Carolina Waterfowl Association (SCWA) on December 16, 1986. He has served as the Executive Director of SCWA since the organization's inception. David graduated from Auburn University in 1983 with an honors degree in Wildlife Management. During his undergraduate and graduate studies, he spent three years in Manitoba, Canada assisting waterfowl researchers on waterfowl and wetland ecology projects and conducting his own research on aspects of mallard nutrition during the summer molting period. David's research was funded by the Delta Waterfowl Foundation. He received his Master of Science degree from the University of Manitoba. Prior to founding the South Carolina Waterfowl Association, David worked for Ted Turner managing more than 2,000 acres of coastal rice field impoundments. David has more than 25 years of experience as a waterfowl biologist and manager. David grew up in north Alabama hunting and fishing with his father, Tony Wielicki. David is an avid waterfowl hunter and fisherman who enjoys sharing the outdoors with his father, Tony, wife Joette and two children, Gracie and Tony. His duties at SCWA include Association management, strategic planning, raising funds and waterfowl management.

D. THOMAS JOHNSON

Jasper County Council

A native of Orangeburg, Thomas Johnson attended the Darla Moore School of Business at the University of South Carolina then attended the USC School of Law.

Johnson moved to Hardeeville in 1975 and started his own law practice. Johnson served as the county attorney, as an attorney in Hardeeville and also worked in the solicitor's office. He served as Hardeeville's city attorney for 10 years before being appointed as Jasper County attorney for about 15 years. Johnson is a member of the Jasper County Council.

MARK LAZARUS

Chairman, Horry County Council

Mark Lazarus is the owner and operator of Wild Water & Wheels, Myrtle Waves and Myrtle Beach Grand Prix. He is the current Horry County Council Chairman and former Councilman. He is married and the father of three children and one grandchild.

VICTOR RAWL

Chairman, Charleston County Council

Victor Rawl is a graduate of the College of Charleston (1968) and a graduate of the University of South Carolina School of Law (1973). He is a retired Lt. Colonel - SC National Guard (1968-1994), a former Assistant Solicitor (1976), a former Member of the SC House of Representatives (1977-1978 and 1980-1981), former SC Workers Compensation Commissioner (1986-1990), and former Circuit Court Judge (1986-1990).

Rawl serves on the Board of Directors for the League of Women Voters and is Vice-Chair, Board of Directors of the Charleston County Public Defenders Corporation.

PAUL SOMMERVILLE

Chairman, Beaufort County Council

Paul Sommerville serves as the Chairman of the Beaufort County Council. Mr. Sommerville is a 1967 graduate of Duke University. He is a management consultant with more than 50 years of labor relations direction and consulting. He is a U. S. Army veteran and is married with two daughters. A Beaufort native, he is an active church member of St. Helena's Episcopal Church. Sommerville lists "Water Quality" particularly with regard to enforcement of stormwater ordinance as one of his primary issues of concern.

RAY FARMER

Director, South Carolina Department of Insurance

Ray Farmer has served as Director for the South Carolina Department of Insurance since former Governor Nikki Haley appointed him on November 13, 2012. Mr. Farmer brings more than forty years of experience in the insurance industry to his leadership role.

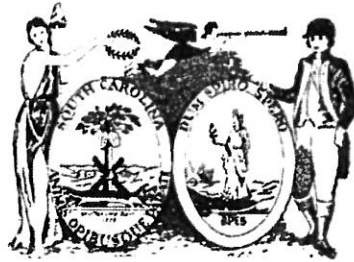
Mr. Farmer served as the Deputy Insurance Commissioner of the Enforcement Division for the Georgia Department of Insurance and more recently Vice President for the American Insurance Association. Mr. Farmer is a member of the State Bar of Georgia and a member of the Tort and Insurance Practice section as well as the Workers' Compensation section.

In 2014, he was named the Industry Person of the Year from the Independent Agents and Brokers of South Carolina. In 2017, Mr. Farmer received The Order of the Palmetto from Governor Haley, the state's highest civilian honor awarded to citizens of South Carolina for extraordinary lifetime service and achievements of national or statewide significance. In 2018, Mr. Farmer oversaw the passing of the Data Security Law – a law that is the first in the nation to require insurance companies to have a comprehensive and secure plan to protect consumer data. Mr. Farmer also has the honor of being elected to serve as the President-Elect for the National Association of Insurance Commissioners.

Mr. Farmer is a native of Atlanta and he and his wife, Gayle, have two children and five grandchildren.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

STAKEHOLDER ENGAGEMENT TASK FORCE

BACKGROUND

Attention to stakeholders is important throughout any process to ensure understanding, appreciation, information sharing, legitimacy and commitment to produce collaborative efforts which result in unique solutions. Stakeholders are defined as the people who have a stake or a vested interest in the program and/or policy, being evaluated and therefore also have a stake in the evaluation. Stakeholders who are involved in an evaluation process contribute to important decisions regarding evaluation, planning, implementation, and use and eliminate or minimize resistance to proposed plans of action.

The South Carolina Floodwater Commission will encompass a wide variety of state and federal employees, business people, regulators, lawmakers, and citizens. The increase in flooding in South Carolina affects everyone in our state. The new Commission is seeking to proactively engage South Carolinians to address potential problems. Sources of excess water which result in flooding are coming to our state from along the coast, from waters flowing into our state in our rivers from the north and from occasional excessive rainfall in our state.

The Commission seeks to address a myriad of issues through a variety of task forces. Each task force will focus on specific areas to help improve our resistance to damage to our state from flooding. Many of these areas will overlap. All will require support from South Carolinians from across the state. Each task force will be headed by co-chairmen from around the state and staffed by volunteers representing many diverse areas. Additionally, each program area will have stakeholders specific to the programs being studied or implemented.

The Stakeholder Engagement Task Force will be the entity that binds the other task forces together through the identification of stakeholders of the various programs and proposals and recognition of program overlaps to avoid competing efforts.

Members of this task force will be charged with communicating with the co-chairs of the various other Task Forces, determining the primary stakeholders which may be affected and facilitating education and communication with each stakeholder.

OBJECTIVES

- Communicate with members of each Task Force to determine the scope of each program and develop a list of potential stakeholders.
- Develop educational talking points for each program and engage stakeholders to educate them on the program goals and status and elicit feedback, recommendations, and collaboration.

DELIVERABLES

Comprehensive list of stakeholders for each task force.

Educational plan developed and executed for engaging all stakeholders.

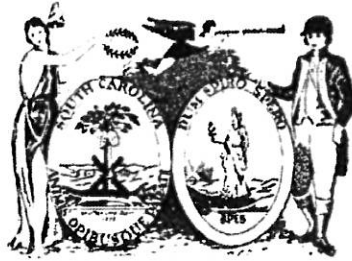
TIME FRAME

1Q '19 List of stakeholders complete.

2Q '19 Initial engagement of stakeholders (ongoing as programs develop).

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

CO-CHAIRMEN FEDERAL FUNDING TASK FORCE

U.S. CONGRESSMAN TOM RICE

7TH Congressional District of South Carolina

A resident of Horry County, South Carolina since the age of 4, Tom Rice has a deep-rooted connection to the Grand Strand and Pee Dee areas. Tom entered Congress with a commitment to make the United States as competitive as possible. From our country's regulatory policies to tax rates, Tom has spent his time in Congress advocating for common-sense reforms to spur economic development and restore America's competitive edge in the world.

Tom serves on the Ways and Means Committee where he uses his experience as an accountant and knowledge as a businessman to implement fiscally responsible policy that makes America competitive in the world. He serves on the Trade, Social Security, and Tax Policy Subcommittees.

Before being elected to Congress, Tom earned both his master's degree in accounting and his juris doctor from the University of South Carolina. After completing his degrees, Tom worked for the accounting and consulting firm, Deloitte & Touche, in Charlotte and earned his CPA certificate. In 1985, Tom returned to his home town of Myrtle Beach to practice tax law with the Van Osdell Law Firm, and in 1997 he established his own practice, the Rice & MacDonald Law Firm, in Myrtle Beach.

Tom has been the recipient of numerous certificates and awards for his professional achievements. In 1994 he was awarded, and continues to hold, an AV (Preeminent) legal rating by Martindale Hubble. From 1994 until 2009, he was certified by the Supreme Court of South Carolina as a specialist in Tax Law, Estate Planning, and Probate Law, and has been included in Best Lawyers in America since 2006.

Tom has been fortunate to serve his community through many charitable and civic organizations including the Myrtle Beach Haven Homeless Shelter (President), Grand Strand Sertoma Club (Secretary, President), Ocean View Foundation (President), Trinity Episcopal Church (Vestry), YMCA, and York Place. He has had the opportunity to sit on several community

advisory boards as well, including the Horry County Probate Court Advisory Committee and the Myrtle Beach Board of Zoning Variances (Chairman). He and his wife, Wrenzie, are the proud parents of three grown sons.

U.S. CONGRESSMAN JOE CUNNINGHAM

1st Congressional District of South Carolina

Congressman Joe Cunningham represents SC 1st Congressional District. Cunningham, 35, is currently a construction attorney at the downtown firm Lyles and Lyles. He attended high school in western Kentucky and spent a couple years at College of Charleston before transferring to Florida Atlantic University where he earned an ocean engineering degree. After a few years as an engineer, Cunningham enrolled in law school at Kentucky. He returned to Charleston in 2014. Congressman Cunningham and his wife Amanda live in West Ashley and also co-own Soul Yoga + Wellness on Ashley River Road.

SEN. CHIP CAMPSER

South Carolina Senator

Chip Campsen is a State Senator for South Carolina's 43rd district and has represented his district in this office since 2005. His district includes parts of Charleston, Beaufort, and Colleton Counties. Campsen serves as both the Chairman of the Charleston County Legislative Delegation and the Chairman of the Charleston County Senate Delegation. He also serves as the Chairman of the Fish, Game, and Forestry Committee and is on the Invitations, Judiciary, Rules, and Transportation Committees.

Campsen is currently the President of Fort Sumter Tours, Inc. and SpiritLine Cruises, LLC, as well as a principal in Campsen Law Firm, LLC. He has experience as a manager of numerous private equity investment companies. Prior to his election to the South Carolina Senate, Campsen served in the South Carolina House of Representatives from 1996 to 2002. Campsen attended Furman University for his B.S., and later attended University of South Carolina, where he earned an M.S. and J.D.

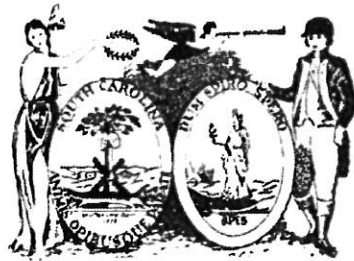
DEBORAH STIRLING

Department of Coastal and Marine Systems Science, Coastal Carolina University

Ms. Stirling is a researcher in the Burroughs and Chapin Center for Marine and Wetland Studies at Coastal Carolina University in South Carolina. She manages the Southeast Atlantic Econetprogram (SEA Econet), which is the National Weather Service's presence in the Southeast for the National Mesonet Program. In addition, she is CFO of Infinite Habitat @ Innovista, an engineering design and sustainability company which offers consulting particularly in renewable energy, and other aspects of the built environment. Ms. Stirling is a retired SC attorney specializing in science, engineering, technology, environment, and climate research. In addition, she was a legislative advisor to the National Academy of Sciences for several years. Ms. Stirling spent 10 years as Subcommittee Counsel for Oceans and Atmosphere for the U.S. Senate Committee on Commerce, Science, and Transportation. Ms. Stirling has a J.D. from the University of South Carolina Law School.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

FEDERAL FUNDING TASK FORCE

BACKGROUND

The federal government has numerous avenues to help mitigate and provides resources to assist states, tribal governments, territories and local communities in their efforts to reduce or eliminate the risk of repetitive flood damage to buildings and structures. The state of South Carolina and its citizens will benefit from assistance from the federal government for preventative measures.

Members of this task force will be charged with identifying and securing sources federal funding to supplement any or all of the Floodwater Commission's task force initiatives. Potential funding sources include DOE, DOI, DHS, FEMA, NOAA, NSF, and DOD.

OBJECTIVES

- Coordinate a series of roundtable meeting with key stakeholders in South Carolina who have been affected by flooding events to discuss available funding sources.
- Identify grants that South Carolina would qualify for including but not limited to: DOE, DOI, DHS, FEMA, NOAA, NSF, and DOD.

DELIVERABLES

Research and identify the key stakeholders for federal funding sources; and conduct meetings to cultivate the relationships between members of the task force and the members of each federal funding source. The purpose is to bridge the gap between the public and private sector to further develop a working relationship to mitigate the risk of a flooding event.

Request funding for technical assistance from the flood impacted communities to ensure the safety of the state of SC and while reducing the burden on the taxpayers of SC. Identify federal funding that is available to develop mitigation strategies and obtain data to prioritize, select,

and develop viable community flood mitigation projects. Funding sources are available for projects with proven techniques that integrate cost effective natural floodplain restoration solutions and improvements that will benefit coastal communities.

Identify federal funding available through the federal appropriations process.

Areas of priority in federal funding; include, but not limited to:

- Infrastructure protective measures
- Floodwater storage and diversion
- Utility protective measures
- Storm water management
- Wetland restoration and/or creation
- Aquifer storage and recovery
- Localized flood control to protect critical facility
- Floodplain and stream restoration
- Water and sanitary sewer system protective measures

TIME FRAME

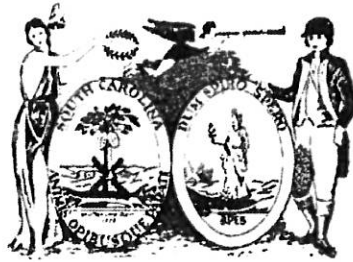
March 2019 – Coordinate a series of roundtable meetings with key stakeholders in South Carolina that will be and/or have been affected by flooding events to assist with receiving grant funding.

June 2019 – Identify grants for flood mitigation; including but not limited to: DOE, DOI, DHS, FEMA, NOAA, NSF and DOD.

Fall 2019 – Identify federal funding available through federal appropriations process.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

CO-CHAIRMEN ECONOMIC DEVELOPMENT TASK FORCE

PETER BREWS

Dean, University of South Carolina School of Business

Peter J. Brews, Ph.D., is the dean of the Darla Moore School of Business. Brews, a native of South Africa, brings more than 25 years of international business education experience to the position, having taught at Duke University's Fuqua School of Business before UNC. At UNC Kenan-Flagler, Brews taught global context to full-time and executive MBA students and global strategy to students in the OneMBA, a program he suggested to the school soon after joining in 2000. In 2006 he was named associate dean of OneMBA and served in this capacity for seven years. Prior to UNC he was assistant professor at Duke University for six years, teaching strategic management and global business strategy in Fuqua's full-time and executive MBA programs.

Brews started his career in banking and finance before charting a course in academia. He started in academia as a lecturer at the University of Witwatersrand in Johannesburg, South Africa, and was a visiting professor at various U.S. universities before serving as an assistant professor at Babson College for a year prior to Duke. Brews earned his undergraduate degree in business and an LL.B and higher diploma in corporate law from the University of Witwatersrand. He went on to earn a master's degree in industrial administration from Purdue University and two doctorates in business administration from the University of Witwatersrand and the University of Pittsburgh.

He has written extensively about strategic management for internet-generation companies and over the past decade has developed a deep understanding of the struggle for productivity worldwide, focusing on how nations, firms and individuals are coping with the fast-changing, complex, highly competitive global environment of the early 21st century. Companies often invite Brews to share his views on the structure and evolution of the global economy and how globalization and the internet and information technology are altering business practice and corporate competitiveness. The companies span industries and include The Boeing Company,

Eastman Chemical Company, Caterpillar, Inc., Progress Energy, Siemens AG, Lucent Technologies Asia/Pacific, The Mandarin Hotel Group of Hong Kong, Ford Motor Company, LG of South Korea and Barclays Bank PLC. He is an editorial board member for the Journal of Asia-Pacific Business and has earned numerous teaching awards for his graduate level instruction.

KELLI S. JAMES

Executive Vice-President, Horry County Chamber of Commerce

Kelli joined the Conway Chamber staff in August 1997. She is a native Horryite having grown up in the Aynor area and graduating Aynor High School. She attended Coastal Carolina University and Horry Georgetown Technical College. Kelli's initial experience with Chamber work was with the Myrtle Beach Area Chamber where she served as Administrative Assistant to the Vice President of Information Services. Following her tenure with the Myrtle Beach Chamber, she was employed with the Horry County Planning Department Street Addressing Office. Kelli's original position with the Conway Chamber was Assistant to the Executive Vice President. As her job duties expanded to include more administrative and financial responsibilities, she was promoted, and her job title was upgraded to Vice President of Administration. She is responsible for all financial aspects of the not-for-profit organization including, accounts receivables, accounts payables, monthly financial statements, yearly audits, etc. Kelli also serves as staff liaison to many of the various division, program, and event volunteer committees.

Kelli is married to Lee James and has two children; a daughter Katie, and a son, Jordy.

BRYAN DERREBERRY

President and CEO, Charleston County Chamber of Commerce

Bryan came to Charleston six years ago to accept the position of President and CEO at the Chamber, after serving in chambers of commerce in Ohio, North Carolina and Kansas. Every day, Bryan is inspired by the incredible members and volunteers who are passionate about their businesses and ensuring that our region excels. He currently lives in Mount Pleasant with his lovely wife, Gail.

JOE ELLERS

Trainer, Consulting Associates

Joe Ellers began his sales career in 1978 and sales management responsibilities in 1984. In his career, he has worked with manufacturers, reps and distribution. His company, Palmetto Associates, has worked with over 1700 customers throughout the world. He has worked with many of the major trade associations and is a long-time faculty member with UID.

He has authored the following books: The Sales Manager's Handbook; The Best Distribution Sales Book Ever; and Market-Driven Manufacturing (with F. Paul Clipp); along with a handful of history and fiction works.

Ellers has also written numerous articles for such publications as Textile Manufacturing, Quality Digest, Bobbin, Southern Purchaser, Networker, Electronic Distribution Today, Better Repping,

The PT Distributor and Tradeshow Week as well as several training programs for the National Management Association.

In 1996, Ellers was elected to the Russian Academy of Quality Problems. He currently serves as a Colonel in the South Carolina State Guard and has served in various government capacities.

State of South Carolina

GOVERNOR HENRY McMASTER



THOMAS S. MULLIKIN, CHAIRMAN

South Carolina Floodwater Commission

ECONOMIC DEVELOPMENT TASK FORCE

BACKGROUND

This task force is charged with identifying and acting upon the numerous economic opportunities that exist associated with an increase in water from river systems and along the South Carolina coast line. Expansion of lake systems including canals and ramps in areas such as Marion County through river diversions could open opportunities for lake and/or canal watersports and recreation while providing for potential electricity generation. Canal systems along the coast and in the low country could have the potential to utilize underused and low-lying areas for tourist/economic development.

Development of targeted activities and programs that work to improve the economic wellbeing and quality of life of a community by building local wealth, diversifying the economy, creating and retaining jobs, and building the local tax base will be explored relative to water use.

Dependent on tourism stimulation, water control efforts may be designed for riverfront activities and recreation such as crew and "blueway" canal access. A blueway is similar to a hiking trail. Physical and geo-positioned markers guide trail users through the waterways. An ideal blueway trail also includes an abundance of scenery and wildlife as well as easy canoe and kayak access.

Increased risk and frequency of extreme flooding, and the trend toward increased urbanization requires water services to function differently and to utilize infrastructure in a more productive, efficient and resilient way. Thus, moving away from a fragmented and narrow perspective of water planning and management is essential to a more integrated multi-dimensional systems perspective. Much of the discourse on flooding currently focuses on major infrastructure solutions, that is, dam infrastructure to manage rivers and floodplains. This flood management effort now includes a combination of dams and modern infrastructure, extensive water efficiency measures and now desalination.

Desalination plants, once constructed and given relatively low marginal costs, could be used to help optimize the water resources system in a city for multiple purposes. The key criteria for the bulk water supply system are water security, system reliability, mitigating flood risk, environmental flows to river, and acceptable water quality.

One of the major challenges during major floods is obviously not the lack of water, but the quality of the water that is used for the drinking water treatment. Most water supplies are relying on surface water (generally dams catching run-off from more or less protected environments). Major rainfall, then, has a very rapid and often highly detrimental effect on the water quality in the rivers and channels flowing into the dam/basins. Further challenges are created when the water extraction points for the drinking water plants are not directly at the dams/basins, but from rivers downstream of the dams/basins. The direct inflows into these rivers are usually even more heavily loaded with sediments and other pollutants than the dam water itself.

The latter situation is exactly what creates a potentially serious water supply shortage during flood events. Large amounts of runoff or “dirty water” pose a risk to surge turbidity levels exponentially, drastically reducing the drinking water production capacity. With water treatment plants operating effectively, the water distribution grid will enable the supply of treated water. Desalination plants would provide full production to add further supply. Without an additional capacity through a desalination plant and a grid’s ability to source water where available across the region and supply it to demand areas, a significant fraction of water supply is at risk.

Together, the parallel of water treatment and desalination holds potential for alternative and independent drinking water production and capital opportunity. Perhaps, with stimulation of independent drinking water production, bottling measures push to develop a more responsible plant-based alternative to traditional plastic packaging.

The new 100% bio-based PET bottle is based on technology developed by biofuels and biochemical company Virent, Inc., Madison, Wis., (www.virent.com) which enables production of BioFormPX (paraxylene) from beet sugars instead of fossil fuels. Paraxylene is the key raw material used to produce PTA (purified terephthalic acid) and DMT (dimethyl terephthalate) feedstocks, which account for the other 70% of bottle-grade PET.

OBJECTIVES

- Identify economic opportunities associated with an increase in water from river systems and along the South Carolina coast line.
- Expansion of lake systems through river diversions could open opportunities for lake and/or canal watersports and recreation.

- Provided potential for electricity generation.
- Tourism stimulation through water control efforts designed for riverfront activities and recreation such as crew and “blueway” canal access.
- Utilize underused and low-lying areas for tourist/economic development.

DELIVERABLES

Inception of economic opportunities associated with an increase in water from river systems and along the South Carolina coast line.

Develop a Local Economic Development (LED) Strategy. This process ensures that all major stakeholder groups are given the opportunity to define what is to be achieved, how it is to be achieved, who will be responsible, and the timeframes associated with the implementation of the LED strategy.

Implement the LED Strategy. Ongoing monitoring and evaluation of specific project outcomes ensures that the strategy continues to lead to the achievement of the LED vision, goals and objectives.

TIME FRAME

1Q '19 Development of stakeholder involvement.

1Q'19 Organization of resources.

2Q'19 Conduct assessment of current economy – Assess access points for water control inception strategy.

2Q'19 Arrive at shared economic vision.

3Q'19 Strategize and implement economic opportunities associated with an increase in water control efforts from river systems and along the South Carolina coast line to maximize potential for development.

South Carolina Floodwater Commission

GOVERNOR HENRY MCMASTER

TOM MULLIKIN, CHAIRMAN

TASK FORCES

ARTIFICIAL REEF SYSTEMS

Recommended Co-Chair

- Allen K. Lipper
- Dr. William Rhee
- Barbara J. Babin
- Brenda Baker
- Rep. Heather Clarendon
- Rep. Jeff Brantley
- Glenn Stevens

Artificial reefs are designed to provide protection from storms and reduce erosion. The reefs are constructed from concrete, steel, or other materials and are placed in strategic locations to absorb the force of incoming waves. They can also provide habitat for marine life and improve water circulation.

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LIVING SHORELINE

Recommended Co-Chair

- Elizabeth Van Kester
- Dr. Paul Fayon
- Dr. Jeffrey Schuman
- Dr. Nicole Ellis
- Dr. Robert Young

Living shorelines use native vegetation to stabilize the shoreline and provide a natural alternative to hard structures. They can also provide habitat for marine life and improve water circulation.

INFRASTRUCTURE & SHORELINE ARMORING

Recommended Co-Chair

- Chelley Hill
- Dr. Rich Vito
- Bryan Stilling
- Ken Stinson
- Jay Folsom
- Sen. Stephen Caldwell
- Rep. William Cogswell
- Alan Williams
- St. Helens

Infrastructure and shoreline armoring are designed to provide protection from storms and reduce erosion. They can also provide habitat for marine life and improve water circulation.

SMART RIVER & DAM SECURITY

Recommended Co-Chair

- Dr. Leonard Frazier
- David Wilson
- Dr. Robert E. Livingston
- Dr. David Chaffin
- Dr. Richard Frazier
- Sen. Keith Williams
- Rep. Keith Williams
- Jeffery Allen
- Margaret McLean

Smart river and dam security are designed to provide protection from storms and reduce erosion. They can also provide habitat for marine life and improve water circulation.

GRID SECURITY

Recommended Co-Chair

- Sen. Thomas C. Alexander
- Mike Korman
- John Korman
- John Clark
- John Clark
- John Clark
- John Clark
- John Clark
- John Clark

Grid security is designed to provide protection from storms and reduce erosion. They can also provide habitat for marine life and improve water circulation.

LANDSCAPE BEAUTIFICATION & PROTECTION

Recommended Co-Chair

- Rep. William Cogswell
- David Wilson
- David Wilson
- David Wilson
- David Wilson
- David Wilson
- David Wilson
- David Wilson
- David Wilson

Landscape beautification and protection are designed to provide protection from storms and reduce erosion. They can also provide habitat for marine life and improve water circulation.

NATIONAL SECURITY

Recommended Co-Chair

- LTC William K. Garrett
- Bryan Stilling
- Rep. James Ryan
- Rep. Robert E. Livingston
- Rep. Robert E. Livingston
- Rep. Robert E. Livingston
- Rep. Robert E. Livingston
- Rep. Robert E. Livingston
- Rep. Robert E. Livingston

National security is designed to provide protection from storms and reduce erosion. They can also provide habitat for marine life and improve water circulation.

STAKEHOLDER ENGAGEMENT

Recommended Co-Chair

- John Stalburg
- Brenda Baker
- John Stalburg
- David Wilson
- David Wilson
- David Wilson
- David Wilson
- David Wilson
- David Wilson

Stakeholder engagement is designed to provide protection from storms and reduce erosion. They can also provide habitat for marine life and improve water circulation.

FEDERAL FUNDING

Recommended Co-Chair

- U.S. Congressman Tim Rice
- U.S. Congressman Joe Cunningham
- Sen. Chip Crump
- Deborah Strong

Federal funding is designed to provide protection from storms and reduce erosion. They can also provide habitat for marine life and improve water circulation.

ECONOMIC DEVELOPMENT

Recommended Co-Chair

- Mark Ryan
- Keith S. Jones
- Bryan Stilling
- Joe Liles

Economic development is designed to provide protection from storms and reduce erosion. They can also provide habitat for marine life and improve water circulation.

Attention to stakeholders is important to the success of the Commission. Stakeholders are defined as the people who have a stake or a vested interest in the program. Stakeholders are involved in the program through the Commission's advisory committee, which provides input on the Commission's work.

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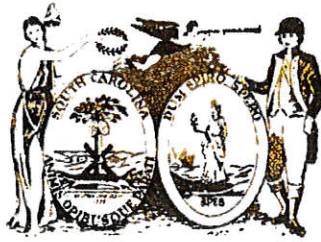


State of South Carolina
Executive Department

FILED

OCT 15 2018

Mark Hammond
SECRETARY OF STATE



Office of the Governor

EXECUTIVE ORDER NO. 2018-50

Authorizing of the South Carolina Floodwater Commission

WHEREAS, South Carolina has experienced numerous episodes of flooding along the coast, rivers, and low-lying interior areas as results of rains, storms, hurricanes and tides that highlight the need for a state-wide plan to accommodate and mitigate flooding impacts in the state; and

WHEREAS, the State will benefit from a coordinated and collaborative effort to identify comprehensive responses and solutions to protect persons, property and enterprises and to fully appreciate the attributes and power of the forces of nature; and

WHEREAS, in these endeavors it is vital that this State work to accommodate and mitigate flooding to lessen the negative impacts to our State's economy to facilitate growth, promote tourism and assist communities and businesses struggling with repeated flooding events; and

WHEREAS, a coordinated national, state, local and community effort is necessary and appropriate to facilitate the interaction between governments at all levels and the private and academic sectors to address these issues.

NOW, THEREFORE, by virtue of the authority vested in me as Governor of the State of South Carolina and pursuant to the Constitution and Laws of this State and the powers conferred upon me therein, I do hereby constitute the South Carolina Floodwater Commission ("Commission") for the purpose of creating a state-wide flood accommodation, response and mitigation effort. The Commission shall serve as a vehicle for authorities to research, evaluate share and coordinate measures and ideas being considered.

The Commission shall identify short-term and long-term recommendations to alleviate and mitigate flood impacts to this State, with special emphasis on cities, communities and

enterprises located on or near the coast and rivers. The Commission shall consider, in its discretion, any and all relevant studies, data, reports and expert and lay opinion on storm water management and use, urbanization impact, coastal shoreline fluctuation, project and operational financing, affordability, available grants, appropriate partnerships, and the impact such decisions have upon neighboring cities, counties and states to ensure that a comprehensive, executable strategy may be adopted.

The Commission shall report to the Governor. The South Carolina Department of Parks, Recreation and Tourism (PRT) shall provide staff support and other resources as necessary. The Governor appoints Tom Mullikin Sr., Esquire, Research Professor at Coastal Carolina University, as Chair of the Commission. The Chair may form subcommittees of the members as deemed necessary. Commission meetings shall be held regularly, broadcast appropriately, and preserved for archival record.

The Commission shall be comprised of the Chair, nine *ex officio* members serving by virtue of office, and no more than eighteen additional appointments by the Governor from the following categories:

- South Carolina Adjutant General, *ex officio*, or designee;
- Director of the Emergency Management Division, *ex officio*, or designee;
- Director of the State Disaster Recovery Office, *ex officio*, or designee;
- Director of the Department of Health and Environment Control (DHEC), *ex officio*, or designee;
- Director of the DHEC Office of Ocean and Coastal Resource Management (OCRM), *ex officio*, or designee;
- Commissioner of Agriculture, *ex officio*, or designee;
- Secretary of the Department of Transportation, *ex officio*, or designee;
- Members of Congress for the 1st and 7th Congressional Districts, *ex officio*, or designees;
- One or more members of the Senate and/or of the House of Representatives;
- Representatives from Chambers of Commerce from coastal counties;
- Mayors from coastal cities and towns;
- Representatives from coastal county councils;
- Commanders of federal military installations located along the coast;
- Individuals who have relevant professional, academic, or research expertise, or experience in relevant areas, including engineering, flood mitigation, public planning, hydrology, marine sciences, environmental protection, or climatology.

The Commission shall call upon federal agencies, including the Federal Emergency Management Agency (FEMA), and the Army Corps of Engineers, US Department of Transportation (USDOT) to assist the Commission. The Commission may call other persons to participate as needed for expertise and relevant information.

October 15, 2018



ATTEST

Mark Hammond
MARK HAMMOND

GIVEN UNDER MY HAND AND THE
GREAT SEAL OF THE STATE OF
SOUTH CAROLINA, THIS 15th DAY
OF OCTOBER 2018.

Henry McMaster

HENRY MCMASTER
Governor